THE LANDSTUHL REGIONAL MEDICAL CENTER

DEPARTMENT OF PATHOLOGY AND AREA LABORATORY SERVICES

LABORATORY TESTING AND SUBMISSION

MANUAL 2005

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DEPARTMENT OF THE ARMY
LANDSTUHL REGIONAL MEDICAL CENTER
CMR 402
APO AE 09180-3460

MEMORANDUM NO 40-113 **31 March 2005**

Medical Services
GUIDE FOR OBTAINING LABORATORY SUPPORT

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1. **PURPOSE.** This laboratory manual is designed to assist the medical staff of Landstuhl Regional Medical Center (LRMC); Heidelberg Army Community Hospital (Heidelberg MEDDAC); Wuerzburg Army Community Hospital (Wuerzburg MEDDAC); all outlying Army Health Clinics; United States Army Europe (USAREUR); and medical units in support of KFOR; SFOR; Operation Enduring Freedom (OEF); Operation Iraqi Freedom (OIF); and all participating Air Force and Navy Laboratory Interoperability sites obtain ancillary support from the Department of Pathology and Area Laboratory Services (DPALS), Landstuhl Regional Medical Center, Landstuhl, Germany.

2. **APPLICABILITY**. This laboratory manual applies to all direct Health Care Providers (HCP) assigned or attached to LRMC and to all submitting activities requesting services or support from the DPALS at LRMC.

3. **REFERENCES**.

a. AR 40-3, Medical, Dental, and Veterinary Care

b. Armed Forces Institute of Pathology Pamphlet No. 40-24, Technical Instructions for the DoD Clinical Laboratory Improvement Program, 1 November 2002.

c. College of American Pathologists' Laboratory Accreditation Program Guidelines and Checklists, College of American Pathologists, current editions.

d. Comprehensive Accreditation Manual for Laboratory and Point-of-Care Testing, Joint Commission on Accreditation of Healthcare Organizations, current edition.

e. 29 CFR Part 1910, Occupational Exposure to Bloodborne Pathogens; Needlesticks and Other Sharps Injuries; Final Rule.

4. **EXPLANATION OF ABBREVIATION AND TERMS**. See Appendix A.

5. **BACKGROUND**.

a. The Department of Pathology and Area Laboratory Services is responsible for providing responsive, high quality laboratory testing in support of patient care. Use of this laboratory manual and adherence to the submission procedures outlined hereinafter will reduce ordering errors and conserve resources.

b. Access to this laboratory manual is also provided on the LRMC intranet (https://www.lrmc.amedd.army.mil) and on the LRMC internet web page (http://www.landstuhl.healthcare.hqusareur.army.mil). From the LRMC intranet home page, click on Resources and then on Lab Info Manual in the dropdown menu that appears. Alternatively, the manual can be accessed from the LRMC MedShare Home page. From the LRMC intranet home page, click on Resources, select MedShare on the dropdown menu, and then select Regs and Pubs on the right side of the page under the General heading. From the LRMC internet home page, click on LRMC in the left side menu listing and then Pathology and Laboratory Services on the web page that appears. A link to the laboratory manual is included on this page.

6. **RESPONSIBILITIES**.

a. Chief, DPALS will develop, maintain, and implement guidance for HCPs to obtain laboratory support and publish this guidance in the LRMC DPALS' Laboratory Testing and Submission Manual.

b. Department/Service/Section Chiefs and Clinic/Hospital staff will familiarize themselves with the LRMC DPALS Laboratory Testing and Submission Manual and obtain laboratory support and service using guidelines found within the manual.

c. When technical and/or procedural guidance changes, DPALS staff will develop and broadcast Laboratory Bulletins in order to update and inform the HCP regarding the new laboratory guidance.

7. GENERAL INFORMATION

a. Organization of DPALS. The Landstuhl Regional Medical Center Department of Pathology and Area Laboratory Services is organized into the following services and sections:

(1) Office of the Chief:

Chief, Laboratory Manager, and NCOIC, DPALS; Central Processing; Quality Assurance/Performance Improvement; Composite Healthcare Computer System (CHCS) Computer Support; and Supply

Area Laboratories Compliance and Consultative Service: provides technical advice and assistance to laboratories in LRMC's outlying health clinics and point-of-care testing sites within LRMC

(2) Clinical Pathology Service:

Core Lab: Clinical Chemistry, Blood Gases, Reference Chemistry, Urinalysis, Hematology and Coagulation, Phlebotomy, Inpatient/Outpatient/Staff Specimen Drop Off, and Reception/Front Desk

Microbiology Section: Clinical Microbiology, Virology, and Immunology

Blood Services Section: Transfusion Service and Blood Donor Center

(3) Anatomic Pathology Service:

Cytology Section

Histology Section

b. Location of the laboratory elements and phone numbers.

(1) Main Laboratory: Located on the second floor, building 3711 [Reception and Waiting Area/Front Desk, Phlebotomy Room, Inpatient/Outpatient/Staff Specimen Drop Off, Office of the Chief (except CHCS Computer Support and Supply), Core Laboratory, Transfusion Service, and Anatomic Pathology Service].

(2) Microbiology Section: Located on the first and second floors, building 3738 (Clinical Microbiology, Immunology, and Virology).

(3) Central Processing: Located on the first floor, building 3738.

(4) Blood Donor Center: Located on the basement floor, building 3738.

(5) Area Laboratories Compliance and Consultative Service: Located on the first floor, building 3738.

(6) CHCS Computer Support: Located on the third floor, Information Management Division, building 3703.

(7) Supply: Located on the first floor, building 3738.

(8) Phone numbers:

DEPARTMENT OF PATHOLOGY AND AREA LABORATORY SERVICES		
Front Desk	DSN Phone:	486-8117/7500
	Fax:	486-7502
	Commercial:	011-49-6371-86-XXXX
Chief		486-7066
Lab Manager		486-8436
NCOIC		486-8437
Secretaries		486-7182/7492
Automation/Computer Support		486-6657/7757
QA/PI Coordinator		486-7841
Supply	Phone:	486-7336
	Fax:	486-7510
Central Processing	Phone:	486-7494/8206/8481
	Fax:	486-6416
Cytology		486-6261/7396
Histology		486-6402/7506/6290
Hematology		486-7511
Transfusion Services		486-7114
Blood Donor Center		486-7107
Clinical Chemistry		486-7499
Reference Chemistry		486-6569/8640
Microbiology	Phone:	486-7482/7513
	Fax:	486-7810
Immunology	Phone:	486-6570/7997
Immunology	Fax:	486-6390
Virology	Phone:	486-7809/6695
	Fax:	486-6390
Morgue		486-6781/7074/7072/6033

c. Laboratory hours and staffing.

(1) The Phlebotomy Section operates 0730 – 1700, Monday – Friday, excluding holidays. Ward rounds are conducted by laboratory phlebotomists once per day beginning at 0600, Monday – Friday, excluding U.S. Government observed holidays and LRMC observed training holidays.

(2) Normal duty hours for all DPALS Services/Sections are from 0730 – 1630. The Core Laboratory and Transfusion Service operate at reduced staffing levels from 1630 – 0730 on normal duty days. The Core Laboratory, Clinical Microbiology, and Transfusion Service also operate at reduced staffing levels on all weekends, training holidays, and holidays. The Anatomic Pathology Service does not routinely provide services during non-normal duty hours, i.e., 1630 – 0730 Monday – Friday, weekends, training holidays, or holidays. However, a Pathologist is on-call should the need for consultation or Anatomic Pathology related services occur.

d. Operational Notes/Restricted Submission or Collection Times.

(1) Laboratory Policy Concerning Patient Requests For Results . Laboratory test results will not be released directly to the patient by laboratory personnel. Laboratory tests are performed upon the order of a treating physician for a variety of circumstances and for many different reasons. The physician is the only individual who can properly interpret the test results for the patient. For this reason, patients querying laboratory personnel about their tests results will be advised to contact their doctor/clinic to obtain their results. Alternatively, the patient may contact personnel in the Release of Information Office within the Patient Administration Division to obtain their results.

(2) Laboratory Policy Concerning Requests for Information Regarding Test Methods Utilized for Analysis . HCP may request information on the current test methods utilized by DPALS, to include method performance specifications, by calling the appropriate section chief or the Laboratory Manager.

(3) Paternity Testing - The LRMC laboratory does not perform paternity testing, nor does it provide specimen collection assistance for such testing. Personnel requiring paternity testing are referred to the Legal Assistance Office for advice and assistance in obtaining this service.

(4) Bone Marrow Donor Program – The LRMC laboratory does not perform bone marrow donor compatibility tests, nor does it keep specimen collection kits on hand. A coordinator from the DoD Bill Young Bone Marrow Donor Program notifies the laboratory's Bone Marrow Donor Program POC of a potential bone marrow donor candidate who is assigned or resides within the LRMC health service area of responsibility. A collection kit is then shipped to the attention of the laboratory's POC. Individuals who are notified that they are potential bone marrow donor candidates should contact the laboratory's Front Desk. The potential donor will then be placed in contact with the laboratory's Bone Marrow Donor Program POC. An appointment will be arranged to have the required compatibility testing specimens collected. The laboratory will ship the collection kits to the designated compatibility testing laboratory after the specimens have been collected.

(5) Time-sensitive, non-Core Lab Tests. Generally, most specimens can be submitted during other than normal duty hours. However, **time sensitive** non-Core Lab tests, i.e., some tests that are performed by DPALS' sections that do not operate 24/7 or that are send out tests, **should not be submitted during other than normal duty hours** since it is unlikely that the test will be able to be referred to a reference laboratory and/or performed within the required time constraints. Specimens for such tests usually have to be recollected on the next duty day. **In order to avoid the need to recollect specimens for unfamiliar/esoteric tests, the laboratory recommends that clinic and ward staff at all times, but especially during other than normal duty hours, consult with laboratory POCs before collecting specimens for such tests to check for submission restrictions.**

(6) Special Procedure Testing: Certain testing protocols require scheduled procedures at specific times. **The following tests have restricted collection times**:

(a) Semen Analysis – performed on Tuesdays and Wednesdays from 0730 until 1030 hrs. Patient must call the Front Desk to make an appointment.

(b) Blood Chromosome Analysis, Fragile X and Genetic Testing of Amniotic Fluid – The specimen must be collected prior to 1200 hrs so that it can be delivered to the reference laboratory on the day of collection. Specimens will be shipped out Mondays through Thursdays only. Specimens must not be collected on German, American, or training holidays. The specimen must be accompanied by a completed Bioscientia form, "Request Form for Postnatal Chromosome Analysis". Forms are available in the laboratory.

(c) Genetics Testing of Tissue Samples – This test requires telephonic coordination with the laboratory prior to specimen collection. The specimen must be sent to the University of Kaiserslautern on the same day that it is collected. The specimen must be accompanied by a completed Bioscientia form, "Request Form for Prenatal Chromosome Analysis". Forms are available in the laboratory.

Specimens should NOT be collected on weekends, holidays, or training holidays due to the limited staffing status within DPALS and the resultant difficulty in shipping, or the inability to ship, a specimen to the University of Kaiserslautern on such days.

(d) Three-to Five-Hour Glucose Tolerance Tests – Patients must arrive prior to 1300 or they will be asked to return on the following day.

e. Specimen Collection Services.

(1) Laboratory Reception: Outpatients are accepted for venipuncture and urine collection on a walk-in basis from 0730 -1700, Monday through Friday, with the exception of U.S. government observed holidays. Patients will be required to sign the laboratory's patient log at the Front Desk in the laboratory Reception and Waiting area and must show a valid identification card.

(2) Phlebotomy services are restricted to the collection of venous specimens from the arm and hand. No arterial specimens or microbiology cultures are collected by laboratory personnel. If a laboratory phlebotomist is unable to obtain the necessary specimens after two attempts, he/she will refer the request to another phlebotomist. One more attempt will be made to collect the specimen. If, after three total attempts, the specimen still has not been successfully collected, the patient and request will be referred back to the ordering physician and ward/clinic for collection of the specimen. If the specimen cannot be successfully collected and delivered to the laboratory by ward/clinic nursing staff within two (2) hours of the patient being referred back to the ordering physician/ward/clinic, the CHCS order will be canceled and the order must be re-input by the ordering physician or ward/clinic nursing staff whenever collection of the required specimen is successful and prior to delivering the specimen to the laboratory.

(3) Ward rounds are conducted once per day beginning at 0600, Monday – Friday, excluding U.S. government observed holidays and LRMC observed training holidays. Only orders with a routine priority should be ordered for collection on ward rounds. If STAT or ASAP testing is required, ward staff must collect the specimen and deliver it to the laboratory immediately.

f. Transportation/Delivery of Specimens.

(1) General Requirements. Specimens must either be collected in, or upon collection be placed into, a leak proof primary container with a secure closure. Before transportation to the laboratory, the primary container must be placed into a secondary container that will contain the volume of released specimen that may occur if a primary container breaks or leaks in transit to the laboratory. Plastic bags with zip-lock or twist-tie closures, or rigid containers with a tight fitting lid or other secure closure that will prevent leakage, may be used as secondary containers. Secondary containers used to transport specimens to the laboratory must have the BIOHAZARD international symbol imprinted on or otherwise affixed to the outside of the container.

NOTES:

OSHA Bloodborne Pathogen regulation requirements: Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport or shipping. The container for storage, transport, or shipping shall be labeled or color-coded. Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment or disposal are exempted from the labeling requirement. Red bags or containers may be substituted for labels.

Diagnostic specimen or infectious agent shipments sent via a commercial carrier, military air transport, U. S. Postal Service, or military postal service must comply with the applicable U.S. Federal transportation laws as published in the Code of Federal Regulations (CFR) and international laws and regulations as published by the International Air Transport Association (IATA).

(2) A LRMC ward or clinic ordering a test can collect the specimen and deliver it to the laboratory or ask the patient to deliver the specimen to the laboratory. Specimens should be transported in a leak proof, puncture resistant, and properly labeled secondary container IAW LRMC Pam 40-9, Infection Control Manual and paragraph 7f(1) above. Specimens can be dropped off at the main laboratory receiving area, accessed via the door **NEXT TO** the Phlebotomy Reception and Waiting area, second floor, building 3711. Specimens dropped off during other than normal duty hours should be brought to one of the evening/night/weekend technicians. The specimens must be signed-in on the laboratory's specimen sign-in log. Patients and hospital staff dropping off specimens must wait while a laboratory technician checks in CHCS to verify the proper orders have been entered into CHCS for that specimen. **Laboratory staff will not accept patient specimens without appropriate associated orders.** If a test for a specimen is ordered as a STAT or ASAP test, the person delivering the specimen should inform the technician of the STAT or ASAP priority of the request when delivering the specimen.

(3) Specimens collected at sites external to LRMC.

(a) Sites that utilize the Central European CHCS Host Platform located at the Landstuhl Army post will utilize Transmittal Lists to maintain accountability for specimens transferred between the specimen collection site and LRMC. Transmittal Lists will be generated by Accession Area. A copy of the Transmittal List(s) will be included with the packaged shipment.

(b) Sites that utilize Laboratory Interoperability will utilize Shipping List Batches to maintain accountability for specimens transferred between the specimen collection site and LRMC. A copy of the Shipping List Batch will be included with the packaged shipment.

(c) Sites that cannot utilize Transmittal Lists or Shipping List Batches because of their remote location must utilize procedures specified in paragraph 31 (Remote Location Specimen Submission Guidelines) and the shipment documents at Table A and B of this manual.

(d) Delivery of Specimens.

[1] Via Courier.

[a] Specimens with the required Transmittal Lists should normally be delivered to DPALS Central Processing, located on the first floor, building 3738, from 0730 – 1630, Monday – Friday, excluding holidays.

[b] Specimens delivered at times other than Central Processing's operational hours must be delivered to the main laboratory's receiving area, located on the second floor, building 3711. The receiving area is accessed via the door **NEXT TO** the Phlebotomy Reception and Waiting area. Specimens must be brought to one of the evening/night/weekend technicians and must be signed-in on the laboratory's specimen sign-in log. Couriers dropping off specimens must wait while a laboratory technician cross-checks the specimen(s) being delivered against the Transmittal List(s) that must accompany the specimen(s) being delivered.

[2] Via commercial carrier, military air transport, U.S. Postal Service, or military postal service.

[a] Diagnostic specimens or infectious agent shipments sent via a commercial carrier, military air transport, U.S. Postal Service, or military postal service must comply with the applicable U.S. Federal transportation laws as published in the Code of Federal Regulations (CFR) and international laws and regulations as published by the International Air Transport Association (IATA).

[b] A copy of the Transmittal List, Shipping List Batch, or the alternative documents at Table A and B must accompany the shipment.

[c] **Activities must ensure use of the correct shipping address for the mode of transport being utilized.** The addresses for the differing modes of transportation are listed in paragraph 31 (Remote Location Specimen Submission Guidelines) of this manual.

[d] Activities using a commercial air carrier (e.g., Fed Ex or DHL) or military air transport are requested to e-mail or fax the air bill/mission information to Central Processing POCs. This information is vital to the Central Processing personnel's ability to initiate queries concerning the shipment should unexpected delays in delivery occur. E-mail addresses or an appropriate fax number can be obtained by calling Central Processing at DSN (314) 486-7494 or via Commercial phone at 49-6371-86-7494.

g. Specimen rejection criteria – general guidelines: The rejection of unacceptable specimens and the special handling of sub-optimal specimens will be decided on a case-by-case basis by a section supervisor. If a specimen must be rejected, the requesting site will be notified and advised of the reason(s) and a comment will be entered in the laboratory report. Specimens may be rejected in the following situations:

(1) Mismatched specimen and request slip – submitting services will be contacted and given the opportunity to correct this situation.

(2) Unlabeled specimens – submitting service will be contacted and given the opportunity to provide a new specimen or request slip.

(3) Inadequate identification provided for the patient or the requesting privileged provider – submitting service will be contacted and given the opportunity to submit the missing information.

(4) Contaminated slip or specimen – submitting service will be contacted and given the opportunity to provide a new specimen or request slip.

(5) Serum/plasma contains gross/moderate amounts of hemolysis (i.e., the serum or plasma is pink or red in color, rather than the normal clear, straw color) – such specimens are generally not acceptable for testing. The submitting service will be contacted and a new specimen will be requested. Errors in performance of the venipuncture account for the majority of hemolyzed specimens and include:

(a) Using a needle with too small a diameter (above 23 gauge)

(b) Using a small needle with a large vacuum tube

(c) Using an improperly attached needle on a syringe so that frothing occurs as the blood enters the syringe

(d) Pulling the plunger of a syringe back too fast

(e) Drawing blood from a site containing a hematoma

(f) Vigorously mixing tubes

(g) Forcing blood from a syringe into a vacuum tube

(h) Failing to allow the blood to run down the side of an evacuated tube when using a syringe to fill it

(i) Applying the tourniquet too close to the puncture site or for too long

(6) Clotted EDTA or Sodium Citrate tubes for Hematology will be rejected. The submitting service will be contacted and a new specimen will be requested.

(7) Other common errors.

(a) Errors affecting all types of specimens.

- insufficient quantity of specimen collected (i.e., collection container or collection tube is not filled to the appropriate level)

- failure to use appropriate collection container/preservative or blood collection tube/anticoagulant for the test requested

- provision of inaccurate/incomplete patient instructions prior to specimen collection resulting in the collection of an incorrect/sub-optimal specimen

- failure to provide all pertinent patient/test information

- failure to tighten specimen container closure/lid, resulting in specimen leakage and contamination of specimen container(s)/request slip(s)

(b) Serum preparation errors.

- failure to separate serum from cells within 30 to 45 minutes after venipuncture

- hemolysis – red cells are damaged during collection/storage/shipment and the intracellular components spill into the serum

- turbidity (lipemia) – cloudy or milky serum, sometimes due to the patient's diet immediately prior to collection of the specimen; failure to ensure the patient followed instructions to fast prior to collection of the blood specimen

(c) Plasma preparation errors.

- specimen collected using a blood collection tube with the wrong/inappropriate anticoagulant

- failure to mix the blood and anticoagulant in the blood collection tube immediately after collection, i.e., clot formation occurs

- failure to separate plasma from cells within 30 to 45 minutes after venipuncture

- hemolysis - red cells are damaged during collection/storage/shipment and the intracellular components spill into the plasma

- incomplete filling of a blood collection tube containing an anticoagulant, thereby creating an error in the anticoagulant to blood ratio which can affect the accuracy of the test result

(d) Urine collection errors.

- failure to obtain a clean-catch, midstream urine specimen

- failure to refrigerate a specimen during/after collection, as appropriate

- failure to provide a complete 24-hour or other timed specimen; failure to provide the patient adequate specimen collection instructions, resulting in the collection of a sub-optimal/unusable specimen

- failure to add the proper preservative to the urine collection container after receipt of the specimen/prior to aliquoting the specimen

- failure to provide a sterile collection container and to refrigerate the specimen after collection if the specimen cannot be delivered to the laboratory within 1 hour after collection when bacteriological examination of the specimen is required

- failure to tighten a collection container closure/lid, resulting in leakage of the specimen and contamination of the specimen container(s)/request slip(s)

h. Laboratory Test Orders.

(1) All laboratory specimens must be clearly and accurately identified.

(2) All lab test requests must be properly ordered by a privileged provider (e.g., a physician, physician assistant, nurse practitioner, dentist, veterinarian, optometrist, podiatrist, or others as approved by the local commander – see AR 40-3, paragraph 14-9, for a complete definition of the categories of personnel that are authorized to order laboratory tests).

(3) Order Timeout Periods.

(a) For outpatients, test orders (either written or in CHCS) **must be less than 45 days old**. When a specimen is received, or a patient presents at the Front Desk of the laboratory, only those tests with orders placed within the last 45 days will be accessioned.

(b) For inpatients, test orders (either written or in CHCS) **must be written within the last 24 hours**. When a specimen is received, only those tests with orders placed in the last 24 hours will be accessioned.

(c) Orders exceeding the timeframes identified in paragraphs 7h(3)(a) and 7h(3)(b) immediately above will be canceled with an order comment stating that the order exceeded the 45 day outpatient (or 24 hour inpatient) timeout period.

(4) CHCS Ordering of Lab Tests. All lab tests should be ordered in CHCS. By ordering in CHCS, the provider is assured that exactly those tests that are desired are ordered. In addition, entering the order in CHCS is much more efficient and traceable than the use of paper lab slips. When ordering a clinical laboratory test in CHCS via the ORE (Enter and Maintain Orders) menu option, answer the following prompts:

NOTES:

Anatomic Pathology, Cytology, and the Blood Bank have different ordering procedures, which are outlined in their respective sections of this manual.

When CHCS is not available to the requesting location (e.g., a remote requesting location), CHCS is down, or a test is not listed in CHCS, requests must be submitted on a written, properly completed lab slip. The ordering provider's full name, the patient's identification and demographic data, the requesting location/MEPRS code, and test information must be legible on all 3 copies of the laboratory slip.

If a test is not listed in CHCS, prior coordination with LRMC DPALS must be completed before the test is requested. Such coordination is required to ensure the collection of an appropriate specimen, proper processing/storage of the specimen, and identification of a laboratory offering the desired test.

IMPORTANT: When entering additional orders for tests on specimens which have already been delivered to the laboratory, PLEASE ALERT LABORATORY STAFF as to the patient's name and the additional tests that are being ordered. The reason for this requirement is twofold.

First, the **ONLY** routine queue for a laboratory staff member to access the CHCS log-in menu option is the delivery of a specimen to the laboratory; CHCS **DOES NOT** give an alert that orders have been entered on a patient. Once the initial order(s) on a specimen(s) has been accessioned/ logged-in, i.e., the order(s) shows as PENDING in CHCS, a laboratory staff member has no reason to go back into the log-in screen, or any other CHCS option, to look for additional orders on a patient. Therefore, an additional order(s) entered after the initial accessioning/logging-in has been completed for which no additional specimen will be delivered to the laboratory **WILL NOT** come to the attention of a laboratory staff member **UNLESS** he/she receives notification from whomever is entering such an order.

Second, the laboratory staff will be able to verify that sufficient specimen is available for the test that is being requested and that the specimen is still a suitable specimen for the test being requested as this can change within a very short period of time for some analytes.

(a) **SELECT PATIENT NAME:**

Enter the patient name or identifier and press <Return>.

(b) **SELECT REQUESTING LOCATION: [DEFAULT]//**

Either press <Return> to accept the default or enter another location and press <Return>.

(c) **SELECT CLINICAL SERVICE/MEPRS CODE: [DEFAULT]//**

Either press <Return> to accept the default displayed or enter the applicable code and press <Return>. The system displays the Patient Order List screen and the ACTION: prompt.

NOTE: The system uses the patient status (inpatient or outpatient) and requesting location to determine the MEPRS code.

(d) **ACTION:**

Press N and <Return> to enter new orders.

(e) **SELECT ORDER TYPE:**

Type LAB and press <Return> to enter Laboratory orders. (NOTE: You may write cross-divisional Laboratory orders for inpatients. The system displays the notification "You are placing this order at a location within [division name]" during the entry of cross-divisional ancillary orders for inpatients.)

(f) **SELECT ORDERING/AUTHORIZING HCP:**

Enter the name of the Privileged Provider initiating the laboratory order.

(g) **ENTER THE ORDER ORIGIN: [DEFAULT}//**

Either press <Return> to accept the default displayed or enter the appropriate origin. The choices for Order Origin are verbal, handwritten, or telephone.

(h) **CHOOSE DEFAULTS (OR PRESS <RETURN> FOR FULL SCREEN ENTRY**)

DATE/TIME OF TEST (NOW, AM, QAM, OR DATE&TIME):

[1] For quick order entry, do not press return, as this will take you to the full screen entry method. **However, full screen entry IS REQUIRED FOR Anatomic Pathology, Blood Bank, and all Continuous lab tests.**

[2] Type NOW, AM, QAM, or DATE&TIME and press <Return>.

[a] Menu prompts for Inpatients if NOW is specified:

{1} **NEXT LAB COLLECT TIME IS [TIME] OK? NO//**

{a} This method allows you to order multiple tests with the same ordering criteria. The LAB COLLECT specimen collection method is for **INPATIENT USE ONLY** as it means the specimen is to be collected during ward rounds conducted by laboratory phlebotomists.

{b} Type YES and press <Return> to accept the displayed LAB COLLECT time,

OR

{c} Press <Return> to specify another time.

- DO YOU WANT TO CHOOSE ANOTHER COLLECTION TIME: N//

Either press <Return> to accept the default LAB COLLECT time displayed at the 'NEXT LAB COLLECT TIME IS [TIME] OK? NO//' prompt (i.e., the 'N//' in the above prompt is equivalent to NOW/NEXT) or type YES and press <Return> to choose another collection time – the system displays a series of lab collection times.

- REQUESTED COLLECTION TIME:

Either enter the desired LAB COLLECT time and press <Return>, OR

Press <Return> to bypass the prompt if you want to select a different collection method (i.e., WARD/CLINIC COLLECT or SEND PATIENT TO LAB) and/or collection priority.

- COLLECTION METHOD: [DEFAULT]//

Specify the collection method and press <Return>. The choices for the collection method are LAB COLLECT, WARD/CLINIC COLLECT, or SEND PATIENT TO LAB.

NOTE: If you do not accept one of the lab collect times displayed at the prompts above, you cannot choose LAB COLLECT for the collection method at this prompt.

- COLLECTION PRIORITY: ROUTINE//

Enter the collection priority and press <Return>. The choices for collection

priority are STAT, ASAP, and Routine. **NOTE:** STAT and ASAP priorities are not appropriate for use with the collection methods of LAB COLLECT or SEND PATIENT TO LAB – specimens required with STAT and ASAP priorities must be collected by ward personnel (i.e., WARD/CLINIC COLLECT) and delivered directly to the laboratory.

[b] If NOW (for Outpatients), or, for both inpatients and outpatients, AM, QAM, or DATE&TIME is specified:

NOTES: NOW indicates the current time and is the preferred quick screen method for outpatients.

AM indicates tomorrow at first Lab Draw time.

QAM indicates for every day at first Lab Draw time.

DATE&TIME – enter desired date and time reference, e.g., T@1600. Future lab orders may be entered with only the date specified, e.g., T+30.

{1} **COLLECTION METHOD: [DEFAULT]**

Specify the collection method and press <Return> The choices for the collection method are LAB COLLECT, WARD/CLINIC COLLECT, or SEND PATIENT TO LAB.

{2} **COLLECTION PRIORITY: ROUTINE//**

Either press <Return> to accept the default or enter another collection priority and press <Return>. The choices for collection priority are STAT, ASAP, and Routine. **NOTE:** STAT and ASAP priorities are not appropriate for use with the collection methods of LAB COLLECT or SEND PATIENT TO LAB – specimens required with STAT and ASAP priorities must be collected by ward personnel (i.e., WARD/CLINIC COLLECT) and delivered directly to the laboratory.

(i) **PROCESSING PRIORITY: ROUTINE//**

Either press <Return> to accept the default or enter another processing priority and press <Return>. The choices for Processing Priority are STAT, ASAP, and Routine. **NOTE:** STAT and ASAP priorities are not appropriate for use with the collection methods of LAB COLLECT or SEND PATIENT TO LAB – specimens required with STAT and ASAP priorities must be collected by ward personnel (i.e., WARD/CLINIC COLLECT) and delivered directly to the laboratory.

(j) **ORDER COMMENT:**

Enter a comment if desired and press <Return>.

(k) **SELECT LABORATORY TEST:**

Enter the laboratory test name and press <Return>. If a selection list is shown, always select the test with the LSL accession. If there is no LSL designation, the next recommended alternative would be an LBL accession.

NOTE: Laboratory test information can be accessed by entering a question mark immediately before the test name and pressing <Return>. Use of this information option does NOT place an order for the named test; if required, an order for the test must be subsequently entered.

(l) The system redisplays the '**SELECT LABORATORY TEST:**' prompt.

Either enter another laboratory test and press <Return>, OR

Press <Return> to return to the '**SELECT ORDER TYPE:** prompt, OR

Press <Return> twice to return to the '**ACTION:**' prompt.

(m) **ACTION:**

Press Q and <Return> to quit and activate the orders.

NOTE: The orders entered by a clerk class user **must be signed by a nurse or HCP to become active. Orders which have not been activated will NOT show up on the CHCS menu option the laboratory uses for accessioning orders/specimens.** Orders entered by a nurse or provider class user are activated upon pressing Q at this prompt.

(n) **PRINT ORDER GROUP? YES//**

Either press <Return> to print the orders you added (will be prompted to enter a device name) or type NO and press <Return> to bypass the print prompt.

(5) Ordering Using Lab Slips.

(a) Laboratory request slips (SF 557 or other appropriate lab slip) must be used when CHCS is down, when CHCS is not available to the requesting location (i.e., a remote requesting location), by clinics not using CHCS, and for tests that are not listed in CHCS. All required information must be legible on all 3 copies of the laboratory slip.

> **NOTE: If a test is not listed in CHCS, prior coordination with LRMC DPALS must be completed before the test is requested.** Such coordination is required to ensure the collection of an appropriate specimen, proper processing/storage of the specimen, and identification of a laboratory offering the desired test.

(b) EACH specimen must be accompanied by a laboratory request slip containing all required information. The request slip, or other accompanying paperwork, must not be contaminated with specimen during the specimen collection process or during transport of the specimen. Contaminated/damp or wet slips/paperwork and the accompanying specimens will not be accepted by laboratory personnel and will be returned to the requesting site. Contamination of the request slips/paperwork can be prevented by taking appropriate care during the specimen collection process and by placing the request slips/paperwork in a waterproof, Ziploc bag, or utilization of a similar mechanism, to isolate/protect the slips/paperwork from contamination resulting from a specimen container that leaks during transport of the specimen to the laboratory.

(c) Demographics: An example of a SF 557 request slip is provided at the end of this section of the submission manual. At a minimum, the lab slip MUST contain the following information:

[1] Patient's full last and first name.

[2] Patient's Rank and Patient Category Code (information is required if the patient is not registered in the Central European CHCS patient data base).

[3] Patient's sex.

[4] Patient's Family Member Prefix (FMP) and the SPONSOR's full Social Security Number.

[5] Patient's SSN (information is required if the patient is not registered in the Central European CHCS patient data base).

[6] Patient's date of birth.

[7] Sponsor's full Name, Branch of Service, Rank, Unit of Assignment, and Date of Birth (information is required if the patient is not registered in the Central European CHCS patient data base).

[8] Name of Requesting Provider, **to include the middle initial**. **The provider's name MUST BE LEGIBLE**; the use of name stamps or stamp plates that provide the full name, i.e., first name, middle initial, and last name of the provider is highly recommended. Use of the requesting provider's full name, to include the middle initial, helps to prevent the confusion that can result during the specimen accessioning process when two or more providers have the same first and last name. **Proper identification of the requesting provider is essential to ensuring the appropriate routing of the test result.** If the provider has not established a User account on the Central European CHCS platform, the provider's last name, first name, middle initial, SSN, date of birth, rank, and specialty must be provided in order to establish the User account. The information provided is cross-checked against credentialing records to verify provider status. The information to establish a User account can be e-mailed directly to Geralyn.Essick@us.army.mil. Ms. Essick may also be contacted at DSN 314-486-8828.

[9] Requesting location and the location's associated MEPRS code for specimens submitted from LRMC or other military MTF. For specimens submitted from civilian physicians/other legally authorized persons ordering a test, the address of the requesting individual must be provided.

[10] Requested test(s).

[11] Date AND time of collection.

[12] Source of specimen, when appropriate.

[13] Clinical information, when appropriate.

[14] For STAT or ASAP requests, a contact telephone number should be provided so the result can be called to the appropriate provider/ward/clinic.

(d) All laboratory request slips MUST be legible. Illegible laboratory slips and the associated specimens will be returned to the requesting location for correction if the requesting location is easily accessible. If the requesting location is not easily accessible, laboratory personnel will properly store the submitted specimens and contact the requesting location and request resubmission of the request slips. Request slips may be resubmitted by fax when necessary.

(e) Patients not registered in CHCS will be mini-registered (MRG) into CHCS by a laboratory technician. **ALL** the patient demographics listed in subparagraph 7h(5)(c) and the additional information annotated as "(information is required if the patient is not registered in the Central European CHCS patient data base)" must be provided on the request slip in order to MRG a patient. Specimens without this information cannot be accessioned and the request slips and associated specimens will be returned to the requesting location for corrective action if the requesting location is easily accessible. If the requesting location is not easily accessible, laboratory personnel will properly store the submitted specimens and contact the requesting location and request resubmission of request slips with the required information. Request slips may be resubmitted by fax when necessary. If the information is not provided within 24-48 hours for requesting locations in USAREUR or a reasonable amount of time, i.e., 1-4 days, for MTF's in CENTCOM, the specimen will be discarded.

(6) Local National employees requiring laboratory tests will be assigned a Pseudo-SSN by CHCS. The assigned Pseudo-SSN must be used to order any future tests for that patient. If the Pseudo-SSN provided by a requesting laboratory is already assigned to another patient within LRMC's CHCS host platform, Central Processing personnel will modify the 800 portion of the Pseudo-SSN only, leaving the remainder of the Pseudo-SSN alone, whenever possible. For example, if a patient specimen is submitted with a Pseudo-SSN of 800-12-3456, and that number is assigned to another patient within LRMC's CHCS host platform, Central Processing personnel will change the number to 801-12-3456. Normally, CHCS constructs a Pseudo-SSN using the patient's date of birth.

(7) Specimens from animals do not require an FMP or SSN. The animal's name MUST be provided, and an ID number and/or the owner's/handler's name should be provided. The animal will be registered in CHCS using the Non-Human Registration (NHR) option. Canine specimens will be registered as "K-9, animal's name" and feline specimens will be registered as "FELINE, animal's name". Military Working Dogs will have their identification number entered after their name. Additional information, such as the name of the owner/handler or clinical information, will be added via CHCS order comments.

i. Specimen Labeling Requirements.

(1) Laboratory Specimens must be labeled with:

(a) Patient's Last Name

(b) Patient's First Name

(c) Family Member Prefix (FMP)

(d) Sponsor's Social Security Number (SSN)

(e) Time of Collection (this is especially important for serial specimens on inpatients, e.g. CK-MB, Peak and Trough Blood Levels, and Blood Cultures)

(2) Anatomic Pathology, Cytology, and the Blood Bank have additional specimen labeling requirements. See their respective sections in this manual for further guidance.

(3) The Laboratory will reject specimens that are not clearly labeled with the above information.

j. Test Priorities.

(1) STAT: This test priority is reserved exclusively for use in a medical emergency (i.e., the saving of life or limb). Specimens associated with STAT test requests are processed/tested before all other specimens of lower test priority. It is inappropriate to use this test priority for other than a medical emergency. The laboratory's target turn around time for STAT requests is the availability of results via CHCS within one (1) hour of receipt of the request/specimen.

NOTE: CODE BLUE/CARDIOPULMONARY ARREST EVENT PROCEDURES

Specimens associated with a Code Blue:

- will be given the highest priority and processed/run immediately on delivery

- laboratory personnel receiving the specimen will accept a written laboratory request slip (i.e., the entry of a lab order into CHCS is NOT required; laboratory personnel will enter the order based on the written request slip)

- on request, a written or printed copy of the results will be provided to the individual delivering the specimen to hand carry back to the Code Blue site

(2) ASAP: This test priority is reserved for medical cases in which there is no immediate danger to the patient but therapeutic intervention is dependent on laboratory findings. This test priority is appropriate for use by outpatient clinics requiring test results before releasing patients. The laboratory's target turn around time for ASAP requests is the availability of results via CHCS within two (2) hours of receipt of the request/specimen.

(3) ROUTINE: This test priority is utilized when test results are not required for immediate patient care requirements. A test requested with a Routine priority is often completed by the close of business on the day the specimen is received in the laboratory, depending on the procedure requested and the time of receipt of the request/specimen.

NOTE: The availability of test results for specimens that are sent to a reference laboratory for testing (i.e., the test is not offered in-house by LRMC DPALS) may, from the date of receipt of the request/specimen, range from 2-3 days up to 4-6 weeks for some highly specialized tests. Please refer to the turn around time listed for the specific test in our Reference Facility Test Listing, or call Central Processing for the turn around time for an unlisted reference test.

k. Specimen Collection/Phlebotomy Procedures.

(1) Specimen Requirements:

(a) Specimen: Refer to the appropriate section of this manual or the LTI option in CHCS for exact specimen requirements for the requested test before obtaining the specimen. Specimens should be delivered to the laboratory promptly after collection so the specimen can be processed for testing as soon as possible.

(b) Shipping and storage: Depending on the specimen required for testing and the test to be performed, processed specimens are maintained at room temperature (i.e., 22° ± 2° C), refrigerated (2° - 10° C), or frozen (-20° C or lower in most circumstances, -70° C or lower in some circumstances). Some specimens require special processing techniques before storage. Refer to the appropriate sections of this manual for specific information.

(c) Fasting specimens. For morning collection of blood specimens, the laboratory recommends that the patient be required to fast from 8 p.m. the evening prior to the collection until the blood specimen is collected the following morning. During this time, the consumption of water, and only water, is allowed (i.e., no coffee, tea, and no chewing of gum).

(2) Evacuated Blood Collection Tubes: The most common blood collection tube brand is the Vacutainer© brand, however, other brands are available. The color of the stopper in the tube indicates whether the tube does or does not contain an additive (anticoagulant or other substance utilized to separate serum and cells). Various anticoagulants are available for use. The most common blood collection tubes used are:

(a) **Lavender top tube** – contains ethylenediaminetetraacetic acid (EDTA) as an anticoagulant. EDTA is the preferred anticoagulant for blood cell counts and for morphologic studies of the cellular constituents of blood as the cellular components of the blood are preserved.

(b) **Blue top tube** – contains 3.2% sodium citrate as an anticoagulant. Sodium citrate is used primarily for the collection of blood specimens that are to be used for coagulation studies.

(c) **Green top tube** – contains heparin as an anticoagulant. Heparin is used for a variety of routine and specialized tests requiring whole blood or plasma as the specimen for analysis.

(d) **Gray top tube** – contains sodium fluoride as an anticoagulant. Sodium fluoride is most often used to collect specimens for glucose and ethanol tests. Sodium fluoride is an antiglycolytic agent and also inhibits microbial growth, which could produce alcohol as a metabolic end product.

(e) **Red top tube** – contains no anticoagulant. Blood collected in these tubes will clot. When a clot forms, a liquid called serum separates from the cellular components of the blood. Serum is used as the specimen of choice for many routine and reference tests.

(f) **Red/Gray marble top tube** – contains no anticoagulant. Blood collected in these tubes will clot. Contains a serum separator (Jelly Belly) gel and a clot activator (i.e., silica that increases platelet activation, thereby shortening the time required for clot formation). After the blood is allowed to clot, the specimen is centrifuged. The gel has a specific gravity that is intermediate to that of the cells and serum, so that it rises during centrifugation of the specimen and lodges between the packed cells and the serum, thereby forming a barrier between the serum and the cells.

(3) Phlebotomy Procedure:

(a) Greet the patient.

[1] In an outpatient setting, the patient's identification card should always be checked to ensure eligibility for care. Verify the patient's information by asking the patient to state his/her name and his/her date of birth. Compare the patient's statement with the information on the preprinted labels.

[a] Maintain a calm attitude.

[b] Do not appear hurried.

[c] Make each patient feel important.

[d] Smile as you greet your patient.

[2] In an inpatient setting:

[a] Compare your request slip or computer labels with the patient's name on the door to ensure that you are entering the correct patient room. Knock on the door and enter the room.

[b] Identify yourself to the patient and explain that you need to draw blood for some laboratory tests.

[c] Compare the information on the patient's hospital identification bracelet with the information on the preprinted labels and request that the patient state his or her name and date of birth. If the patient does not have a hospital identification bracelet, ask the patient to state his/her name and date of birth. If the patient is not able to give this information, ask a nurse to verify the patient's identification.

[3] Explain to the patient that the venipuncture might be slightly painful. Never tell a patient that the procedure will not hurt.

(b) Positioning the patient. The patient is positioned for four reasons: so the vein you will use is readily accessible; so you are able to work in a comfortable position; so that if the patient has a reaction to the venipuncture, they will not fall; and to make sure the patient does not have anything in their mouth (no food or liquid, chewing gum, or thermometer should be in the patient's mouth at the time the specimen is drawn).

[1] Sitting.

[a] Ask the patient to sit in the chair with his or her arm on the armrest.

[b] The arm should be placed on the armrest in a manner that makes a generally straight line from the shoulder to the wrist. There should be only a slight bend at the elbow.

[2] Lying Down.

[a] The patient should lie comfortably on his or her back. Use a pillow for extra support under the arm if needed.

[b] The patient should extend the arm in a manner that makes a generally straight line from the shoulder to the wrist.

(c) Assemble the necessary supplies for performing the venipuncture. Always check the expiration date of the evacuated collection tube and other supplies prior to use. Generally, the expiration date refers to the last date the tube may be used for collection of blood.

[1] Blood collecting tubes – Vacutainer® or other blood collection tubes

[2] Needle

[3] Vacutainer® holder

[4] Tourniquet

[5] Gloves (Use latex-free gloves if the patient has an allergy or sensitivity to latex)

[6] Alcohol pads (Use betadine pads if the patient is allergic to alcohol)

[7] Gauze pads

[8] Adhesive Tape or Coban®

(d) Select a venipuncture site.

[1] Always try to identify the median cubital vein first. It is usually bigger and anchored better and it bruises less. The cephalic vein (depending on size) is the next best site to attempt a venipuncture, although care must be taken as it has a tendency to roll. The basilic vein lies close to the brachial nerve and artery, and for this reason should be avoided. Other sites that may be used are the:

[a] Back of the hand

[b] Knuckle of the thumb or index finger

[c] Surface of the forearm

[d] Dorsal wrist area above the thumb

[2] A vein satisfactory for a venipuncture attempt will feel like an elastic tube that gives under the pressure of your finger. The ideal vein should be visible, straight, not thrombosed or have a hematoma from a previous venipuncture, and well supported by subcutaneous tissue so it will not roll.

[3] If a satisfactory vein cannot be found, try the following:

[a] Try the other arm or ask the patient to make a fist again

[b] Apply the tourniquet, remembering that the tourniquet should never be left on the arm for more than one minute

[c] Massage the arm from wrist to elbow

[d] Tap a few times at the vein site with your index finger

[e] Warm the site using a moistened towel or cloth or chemical warming pad made for such a purpose

[f] Lower the arm over the bedside or venipuncture chair

[4] Do not attempt to collect blood from the following areas:

[a] Same limb as an IV: If blood is collected from a vein above the point where a patient is receiving IV fluid, the sample will be diluted with the IV fluid, producing an inaccurate result when tested.

[b] Arm on same side as a mastectomy: Any break in the skin may lead to an infection and increased swelling due to obstruction of the lymphatic system.

[c] From a limb with a cannula, vascular graft, or an Arteriovenous Fistula (circulatory access for hemodialysis created by suturing a vein directly to an artery): The tourniquet may precipitate clotting by slowing the flow of blood. Punctures of the skin in this extremity increase the possibility of thrombosis and infection.

[d] Areas with extensive scarring: Healed burn areas should be avoided.

[e] Area with a hematoma: Specimens collected through a hematoma area may cause erroneous test results. If another vein site is not available, the specimen must be collected distal to the hematoma.

(e) Perform the venipuncture.

[1] Apply a tourniquet approximately 3 – 4 inches above the selected venipuncture site. Use sufficient pressure to stop venous return of blood but not enough to stop arterial flow. A radial pulse should be detectable. Do not leave tourniquet on for more than one minute while you search for a vein.

[2] Have the patient open and close his/her fist several times, then hold a clenched fist. Vigorous hand exercise, e.g., "pumping" should be avoided because it results in hemoconcentration, which may affect some test values. Always palpate for a vein, even when the vein is visible; arteries pulsate, so make certain the structure you feel is not pulsating. Choose the vein that feels fullest and most elastic to your touch. If the vein has been used repeatedly for fluid injections and punctures, it may feel cord-like. Such a vein should not be used because it is difficult to obtain blood from it. If the patient has had a venipuncture before, he/she may be able to identify a particular vein/site for your venipuncture attempt. If more than 1 minute passes while you are trying to locate a suitable vein, have the patient release or cease clenching their fist, and release the tourniquet for at least 3 minutes. Then, re-apply the tourniquet and have the patient re-clench their fist. Prolonged obstruction of blood flow by the tourniquet (i.e., tourniquet in place for longer than 4 to 5 minutes) changes some test results (e.g., erroneously high values for all protein-based analytes, packed cell volume, and other cellular elements).

[3] Cleanse the skin over the venipuncture area with the alcohol (or betadine) pad. Use firm, circular movements, starting from the center of the selected venipuncture site and moving outward. This will move surface skin contaminants away from the venipuncture site. Allow the skin to air dry or dry the area with sterile gauze. Performing the venipuncture before the alcohol has dried causes a stinging sensation for the patient and may hemolyze the specimen. DO NOT PALPATE THE AREA AGAIN AFTER CLEANSING.

[4] Remove the protective cover from the needle. Inspect the needle for barbs, contamination, and bends or kinks. Position the needle, bevel up, in line with the vein. Place the thumb of your free hand 1 - 2 inches below the needle entry site and draw the patient's skin taut to stabilize the vein and prevent the vein from rolling beneath the skin. **NOTE: From this point on be prepared to react to a sudden and unexpected loss of consciousness.**

[5] Ensure that the needle is bevel up, at about a 15 to 30 degree angle with the skin, and in line with the vein to be punctured. Pierce the skin with a smooth motion, guiding the needle into the vein. As the needle enters the vein, a little "give" will be noted. After the vein is entered, decrease the angle of the needle and slide the needle further into the vein.

[6] Tell the patient to relax and unclench his/her fist. Collect the specimen while holding the Vacutainer© needle, tube, and Vacutainer© unit steady. Keep the needle at the same angle at all times. Push the blood collection tube as far forward as possible and observe for blood flowing into the tube. For multiple specimens, remove the filled tube and insert another tube. Repeat this procedure until the desired number of tubes is filled. Remember to fill the tubes in the prescribed order for the different types of anticoagulants and to mix additive tubes immediately after collection by gently inverting the tube 5 – 10 times before the next tube is inserted into the blood tube holder. If blood collection will require several minutes, the tourniquet should be removed as soon as there is good blood flow into the tube. Optimal recommended total tourniquet time, including prepuncture search for a vein, should not exceed 1 minute.

[7] If blood stops flowing before the tube is 2/3 full, pull back slightly on the needle in an attempt to increase blood flow.

[8] If blood fails to enter the tube or syringe:

[a] If the vein is not punctured during the initial insertion, stabilize the vein with your thumb, pull the needle back slightly until the tip of the needle is just below the surface of the skin, and then try to direct the needle point into the vein again. If the tip of the needle is withdrawn outside the skin surface, discontinue the venipuncture. Release the tourniquet and place a 2" X 2" piece of sterile gauze over the venipuncture site. Withdraw the needle and immediately, utilizing the sterile gauze, apply firm pressure over the puncture site. ALWAYS release the tourniquet before the needle is withdrawn from the vein to prevent hematomas. When the failed venipuncture site has ceased to bleed and has been bandaged appropriately, reset supplies and repalpate to locate a suitable vein before attempting the venipuncture again.

[b] If the needle goes to one side of the vein, stabilize the vein with your thumb, pull the needle back slightly until the tip of the needle is just below the surface of the skin, and then try to direct the needle point into the vein again. If the tip of the needle is withdrawn outside the skin surface, discontinue the venipuncture. Release the tourniquet and place a 2" X 2" piece of sterile gauze over the venipuncture site. Withdraw the needle and immediately, utilizing the sterile gauze, apply firm pressure over the puncture site. ALWAYS release the tourniquet before the needle is withdrawn from the vein to prevent hematomas. When the failed venipuncture site has ceased to bleed and has been bandaged appropriately, reset supplies and repalpate to locate a suitable vein before attempting the venipuncture again.

[c] If the needle goes completely through the vein, slowly withdraw the needle until the blood begins to flow.

[d] Readjust the angle of the needle to ensure the bevel of the needle is not against the wall of the vein.

[9] If the venipuncture is still unsuccessful after an attempt to redirect/reposition the needle, or if a hematoma begins to appear, release the tourniquet and place a 2" X 2" piece of sterile gauze over the venipuncture site. Withdraw the needle and immediately, utilizing the sterile gauze, apply firm pressure over the puncture site. ALWAYS release the tourniquet before the needle is withdrawn from the vein to prevent the formation of a hematoma. When the failed venipuncture site has ceased to bleed and has been bandaged appropriately, reset supplies and repalpate to locate a suitable vein before attempting the venipuncture again.

(f) Completing the Procedure.

[1] Release the tourniquet and place a 2" X 2" piece of sterile gauze over the venipuncture site. Withdraw the needle and immediately, utilizing the sterile gauze, apply firm pressure over the puncture site. ALWAYS release the tourniquet before the needle is withdrawn from the vein to prevent the formation of a hematoma.

[2] Have the patient elevate his/her arm slightly, keeping it fully extended and ask him/her to apply pressure for 2 to 3 minutes to the venipuncture site. If the patient cannot do this, do it for them. DO NOT ALLOW THE PATIENT TO BEND HIS OR HER ARM WHILE APPLYING PRESSURE AS THIS POSITION DOES NOT APPLY SUFFICIENT PRESSURE TO THE PUNCTURE SITE AND MAY ALLOW BLOOD TO LEAK OR TO BE FORCED INTO THE SURROUNDING TISSUE, PRODUCING A HEMATOMA. If a patient is on anticoagulant therapy, the site may bleed for a longer period of time - continue to apply pressure for at least 5 minutes and then check to determine if the bleeding has stopped.

[3] While the patient is elevating his/her arm, dispose of the needle in an approved sharps disposal container.

[4] Label the tube(s) with the preprinted CHCS label, or write the patient's full name and FMP/SSN on the tube(s). For blood bank specimens, indicate the date/time of collection and sign your name on the label(s) and appropriate form(s) (i.e., SF 518).

[5] Check the venipuncture site. If the bleeding has stopped, apply an adhesive or Coban© bandage over a 2" X 2" piece of sterile gauze that has been folded in quarters, ensuring light, direct pressure is maintained over the venipuncture site. Ask the patient if the bandage is comfortable, i.e., not too tight or restrictive.

[6] Complete the lab slip, if necessary, by filling out the date and time collected section, as well as initialing any blocks required by local procedures.

[7] Ensure the patient is not feeling faint or nauseous before releasing him/her.

(g) Dispose of uncontaminated plastic and paper trash in the appropriate trash receptacle. Dispose of contaminated gauze and other items in an approved infectious waste receptacle.

(4) Phlebotomy Procedural Notes:

(a) Other methods of collection.

[1] Syringe method:

[a] A syringe and needle should be used to collect blood from patients with more difficult (i.e., small or fragile) veins or when collecting a specimen for a culture.

[b] For easier operation, the plunger should be loosened in the syringe by pulling it out and pushing it in once or twice before attaching the needle to the syringe.

[c] The same basic phlebotomy procedure is followed to access the vein. Once the needle is in the vein, pull GENTLY back on the syringe plunger to fill the syringe. Pulling on the plunger too hard or fast will hemolyze the blood cells and may collapse the vein. After removing the needle and applying gauze to the puncture site, blood may be transferred to the collection tubes by the following method:

Use a safety transfer device to transfer the blood to an evacuated tube. If a safety transfer device is not available, utilize the following one-hand method to effect the transfer. With the tubes standing upright in a rack (i.e., the evacuated tubes must be placed in a rack and NOT held in the hand during this procedure), puncture the rubber stopper of the evacuated tube with the syringe needle and allow the tube's vacuum to draw in the appropriate amount of blood. **DO NOT FORCE THE BLOOD INTO THE TUBE AS THIS MAY LEAD TO HEMOLYSIS OF THE RED BLOOD CELLS.** The needle should be angled toward the side of the tube for gentler transfer of the blood, thereby also helping to prevent hemolysis. Immediately mix any tubes containing anticoagulants. Once all required tubes are filled, dispose of the needle and syringe in the sharps container.

NOTE: Removal of the rubber stopper, adding the blood from the syringe, and restoppering the tube is NOT recommended because aerosols are produced and tubes are not as tightly stoppered for transport.

[2] Winged infusion set (butterfly):

[a] A winged infusion set can be used instead of a syringe and needle for very difficult veins (i.e. very small veins or for obtaining specimens from children). The winged collection set is a closed system.

[b] Use of this method takes some practice and requires some manual dexterity. You can tape down the wings of the "butterfly" and cover the needle portion with sterile gauze or have a second phlebotomist control and change the tubes while you maintain control of the needle if this method is difficult for you.

[c] Since the tubing of the "butterfly" contains air, it will under fill the first evacuated tube by 0.5mL. Therefore, a red-topped tube should be filled prior to collecting any tube with additives.

(b) Order of precedence for blood collection.

[1] According to NCCLS (CLSI) Standard H3-A5, evacuated blood tubes (e.g., Vacutainer®) should be collected in the following order:

[a] Blood culture vials/tubes

[b] Coagulation tube (e.g., blue closure)

[c] Serum tube, with or without clot activator, with or without gel (e.g., red closure)

[d] Heparin tube, with or without gel plasma separator (e.g., green closure)

[e] EDTA (e.g., lavender closure)

[f] Glycolytic inhibitor (e.g., gray closure)

NOTES:

The order of draw has been revised to reflect the increased use of plastic blood collection tubes. Plastic serum tubes containing a clot activator may cause interference in coagulation testing. Glass non-additive serum tubes may be drawn before the coagulation tube.

When using a winged blood collection set for venipuncture and a coagulation tube is the first tube to be drawn, a discard tube should be drawn first. The discard tube must be used to fill the blood collection tubing dead space and to assure maintenance of the proper anticoagulant/blood ratio. The discard tube need not be completely filled. The discard tube should be a nonadditive or a coagulation tube.

Coagulation Testing: Studies have shown that the PT (INR) and APTT results are not affected if tested on the first tube drawn. Since it is not known whether other coagulation testing is affected, it may be advisable to draw a second tube for other coagulation assays. When a syringe system is used and a large specimen is taken, part of the blood from the second syringe should be used for the coagulation specimen.

[2] Order of blood collection for syringe method: Use the same order of draw as for a venous blood collection tube system (see subparagraph immediately above).

(5) Potential Complications of Phlebotomy Procedures:

(a) Anxious patients: Reassure the patient. Explain the procedure to alleviate any fears. Do not patronize or make light of the patient's fear.

(b) Patient refusal: Try to persuade the patient that the blood collection is a necessary part of their clinic visit and treatment. If the patient still refuses, report the problem to your supervisor or the nurse in charge of the ward.

(c) Hematomas: Most hematomas are caused when a needle passes completely through a vein, or if the patient has abnormal clotting times. Any time a hematoma appears, release the tourniquet immediately, withdraw the needle, and apply direct pressure to the venipuncture site with a sterile gauze pad for at least five minutes. If bleeding or swelling persists, notify your supervisor. To prevent a hematoma when performing a venipuncture, the phlebotomist should:

[1] Make sure the needle fully penetrates the uppermost wall of the vein (partial penetrations may allow blood to leak into the soft tissue surrounding the vein by way of the needle bevel).

[2] Remove the tourniquet before removing the needle.

[3] Use the major superficial veins.

[4] Hold the venous blood collection assembly still while collecting the specimen.

[5] Before bandaging, ensure that the puncture to the vein has sealed by observing for hematoma formation after pressure is released.

[6] Apply a small amount of pressure to the area with the gauze pad when bandaging the arm.

(d) Fainting:

[1] The most frequent reactions are mild (grade 1) and due to psychological factors such as nervousness about having blood drawn or the sight of blood, but may also be due to other unexplained causes.

[2] Symptoms are sweating, unnatural paleness, weakness, dizziness, nausea, rapid breathing, possible twitching or muscle spasms, and occasional fainting (syncope or grade II reaction).

[3] If the patient displays any of the above symptoms, or complains of any of these symptoms, immediately discontinue the venipuncture by removing the tourniquet and needle. Apply direct pressure to the venipuncture site with a sterile gauze pad. You may have the patient lie down until he/she feels better and then allow them to slowly sit up and then slowly stand on their feet. Ask the patient to stay in the area for at least 15 minutes or until you are sure he/she is fully recovered. In cases of hyperventilation, have the patient breathe into a paper bag.

[4] If the patient faints, monitor the patient's vital signs, and seek assistance from a nurse, doctor or pathologist. If the patient is not breathing, call for help and begin rescue breathing. If there is no pulse, call for help with the patient and for assistance in initiating the code for cardiac arrest. Begin CPR. If the patient is still breathing, take the following steps:

[a] Carefully move the patient into a recumbent position on a padded table or on the floor if unable to move the patient to a bed or table.

[b] Elevate the patient's feet higher than their heart.

[c] Remove or loosen tight clothing.

[d] Place a cold compress on the forehead or behind the neck.

[e] Obtain assistance if necessary.

[f] The use of ammonia inhalants may be associated with untoward effects and is not recommended.

(e) Nausea.

[1] Make the patient as comfortable as possible.

[2] Instruct the patient to breathe deeply and slowly.

[3] Apply cold compresses to the patient's forehead.

[4] Obtain assistance if necessary.

(f) Vomiting.

[1] Give the patient an emesis basin or carton, and have tissues ready.

[2] Give the patient water to rinse out his/her mouth.

[3] Obtain assistance if necessary.

(g) Hemolysis of the specimen. To prevent hemolysis when performing a venipuncture, the phlebotomist should:

[1] After cleansing with the alcohol pad, allow the venipuncture site to fully air dry.

[2] Never draw blood through a hematoma.

[3] If using a syringe, make sure the needle is fitted securely on the syringe to avoid frothing.

[4] When using a syringe and needle, avoid drawing the plunger back too forcibly.

[5] gently invert the blood collection tube to mix additive specimens as recommended by the manufacturer.

(6) Indwelling Lines or Vascular Access Devices (VAD). If blood must be drawn through a VAD, possible heparin contamination and specimen dilution should be considered. The line should be flushed with 5 mL of saline, and the first 5 mL of blood or six dead space volumes of the VAD discarded.

PROPER FORMAT FOR SF 557, MISCELLANEOUS LAB SLIP

(Note this form below not intended for reproduction)

Please fill out this required information in the SF557. SF557 Forms can be obtained through Publications.

1. Patient name
2. FMP/SSN
3. DOB
4. UNIT
5. RANK
6. Name of Requesting Location and associated MEPRS code
7. Urgency Status
8. Patient Status
9. Requesting physician's signature
10. Tech's signature (in Reported By Block)
11. Date Requested
12. Remarks
13. Date and Time specimen obtained
14. Test requested

<table>
<tr><td colspan="3">Patient Name: Last Name, First Name Middle Initial UNIT: 1-4 CAV
FMP/Social Security Number: 20/123-45-6789 RANK: PFC
DOB: DD/MM/YY

Name of Health Clinic (MTF) 1st CSH

Enter in above space PATIENT IDENTIFICATION – TREATING FACILITY – WARD NO – DATE</td><td>MISC
URGENCY
✍ ROUTINE
✍ TODAY
✍ PRE-OP
✍ STAT</td><td>SPECIMEN/LAB RPT. NO.
PATIENT STATUS
✍ BED
✍ NP
✍ AMB
✍ DOM
✍ OUTPATIENT
SPECIMEN SOURCE (Specify)</td></tr>
<tr><td colspan="2">REQUESTING PHYSICIAN'S SIGNATURE</td><td>REPORTED BY MD

TECH</td><td>Date:
dd/mm/yy</td><td>LAB ID NO.</td></tr>
<tr><td colspan="5">REMARKS
INFORMATION PERTINENT TO THE TESTING DESIRED</td></tr>
<tr><td>TEST(S)</td><td>SPECIMEN TAKEN</td><td>TIME am pm
DATE dd/mm/yy</td><td>REQUESTED</td><td>TEST REQUESTED</td><td>RESULTS</td><td>THIS SECTION WILL BE FILLED OUT BY THE TESTING FACILITY.</td><td>MISCELLANEOUS SF 557</td></tr>
</table>

8. **Alphabetical Listing of All Available Tests**. Please See APPENDIX B.

The table at Appendix B contains the listing of tests, as contained in the individual section tables, available at LRMC or at the military and commercial laboratories we refer testing to and the specimen submission requirements for those tests. (NOTE: Not all tests sent to referral laboratories are listed in this manual, only those most commonly ordered are listed. The most up to date listing of tests and submission requirements is on the CHCS system itself. Should there be any question regarding whether a test is available or where it is available and what specimen submission requirements pertain, please check CHCS using the LTI (Lab Test Information) function. Alternatively, submitters can access Bioscientia's (our primary referral laboratory) submission manuals at http://www.bioscientia.de/. Click on the British flag on Bioscientia's Home Page to view the site in English. Please call the Central Processing Section of the lab at 486-7494 / 8019 / 8092 if you cannot find the test you desire.)

9. **CHEMISTRY (CORE LABORATORY)**

a. General Information. The Chemistry section (a part of the Core Laboratory) is located on the second floor in the laboratory complex in Building 3711. Normal duty hours for section personnel are 0730-1630, Monday through Friday. The section operates at a reduced staffing level to handle critical testing requirements from 1630-0730, Monday through Friday and on weekends, training holidays, and holidays. It is necessary to stress that routine priority specimens submitted during reduced staffing times may be processed and stored, dependent on the amount of critical workload present, until the test(s) can be performed during normal duty hours.

b. Problems, complaints or questions should be directed through the section, to the Chief, Core Laboratory (486-8185) or the Medical Director, Clinical Pathology.

c. Legal Blood Alcohol Testing.

(1) There are two categories of blood alcohol testing: medical and legal. A medical blood alcohol test is intended to provide information for medical treatment purposes only. It is performed in-house and is ordered in exactly the same manner as any other clinical laboratory test. A legal blood alcohol is intended to be submitted as evidence in a legal proceeding. Specimens for legal blood alcohol are, as of 1 June 2004, now performed in-house. Orders for legal blood alcohol tests are <u>not</u> entered into CHCS. Legal blood alcohol test requests are initiated by a legal authority such as the local national or military police, a military magistrate, or a unit commander and the individual is generally brought to the Emergency Room for specimen collection. (See USAREUR Regulation 40-160, Blood Alcohol Testing of US Personnel in USAREUR, for further information regarding legal blood alcohol testing.)

(2) Specimens Required for Legal Blood Alcohol Testing.

7 to 14 mL NaF (gray top tubes) – send two tubes

(3) After collection, hand mix the blood tubes by 5 – 10 gentle inversions and label all specimens with the full name, FMP, and full SSN of the individual from whom you are collecting the specimen. Tubes should be sealed with parafilm or tape.

(4) Shipping procedures.

(a) Specimens collected within traveling distance of LRMC may be delivered directly to DPALS and deposited in the secure lockbox in the laboratory. Follow the instructions on the DPALS lockbox.

(b) Specimens requiring shipment should be packed UNFROZEN in a small plastic "lockbox" intended for transport of legal specimens. The "lockbox" should be labeled with the patient's name and the paperwork attached to the box before being sent to LRMC, DPALS. (Address specific questions on appropriate "lockboxes" to Central Processing, DPALS.) Do not package more than one set of patient specimens in each box.

(c) Each individual's set of specimens MUST have an accompanying DA Form 4137 and any other documentation pertinent to the case (paperwork should be sealed in a separate plastic bag). Note that failure to submit a properly completed DA Form 4137 will delay processing, may result in an incomplete analysis of the submitted specimens, and may cause test results to be returned to the wrong address. DA Form 4137 can be obtained from FormFlow.

(5) The POC (Point-of-Contact) for the submitted case should include their printed name, telephone number, FAX number, and an e-mail address (if applicable) in the appropriate box on the DA Form 4137 to facilitate communication concerning "problem" cases.

(6) Please call for information or clarification concerning collection and shipment policies if you are unsure of what to do. It is better to temporarily delay shipment of specimens than to send specimens improperly collected, labeled, packaged, and shipped, or to submit cases without the correct paperwork.

(7) Legal Blood Alcohol Test Results are released by the laboratory **only** to the Patient Administration Division (PAD) of LRMC, **never** directly to the police or unit personnel. Police or unit commanders must contact the Release of Information Office of the PAD (486-6530/8822) to obtain the test results.

d. When ordering a Triple Screen, it is necessary to complete a triple marker screening form (see example at the end of this section). The lab must be able to return results and contact the provider if there are questions or an elevated risk is predicted. The following information must be completed:

(1) **Date Sample Collected**: Enter the date when the blood sample was drawn.

Circle one: First Test, First Repeat, or Second Repeat.

(2) **Gestational Age Determination**: *Select one method only*.

(a) If LMP, enter date last menstrual period began.

(b) If Ultrasound or Examination, enter the date of the ultrasound or examination and complete #3.

(3) **Weeks of Gestation on Date of Ultrasound/Physical Exam**: Enter the gestational age in weeks and days *on the date the ultrasound or exam was performed*.

(4) **Mother's Weight (lbs)**: Enter the patient's weight on or about the date the specimen was collected.

(5) **Race:** *Circle one only.*

(6) **Multiple Gestations:** *Circle one only.* Is the patient expecting single, twins, or triplets? If unknown, select Single.

(7) **Diabetic:** *Circle one only.* Circle Yes if the patient is diabetic; No if not diabetic. Otherwise, circle Unknown.

(8) **Family NTD History:** *Circle one only.* If the patient has a family history of Neural Tube Defects (NTD), circle Yes. If not known, select Unknown.

DEPARTMENT OF THE ARMY
LANDSTUHL REGIONAL MEDICAL CENTER
CMR 402
APO AE 09180
Department of Pathology and Area Laboratory Services
Reference Chemistry

Triple Marker Profile (MSAFP/hCG/free Estriol) Screening Test Request Form (Using Maternal Serum**)**

Name_____
Last, First M.I

Facility_____

DOB_____/_____/_____
mo *day yr*

Provider_____

FMP/SSN_____/_____ MTF Identifier_____

Phone_____

Triple Marker Profile Serum

The following information is mandatory for interpretation of results.***
(Please call DSN 486-8092 if you have questions.)

1. Date Sample Collected_____/_____/_____

   First Test First Repeat Second Repeat

2. Gestational Age Determined by:

3. Weeks of Gestation on Date of Ultrasound/Physical Exam: _____/_____
   weeks days

4. Mother's Weight (lbs)_____

5. Race: (*Circle one only*)

   White Black Hispanic Other (Includes: Oriental)

6. Multiple Gestations: (*Circle one only*)

(Circle one **only)**

LMP, on date _____/_____/_____
mo day yr

***Ultrasound, on date _____/_____/_____**
mo day yr

***Examination, on date _____/_____/_____**
mo day yr

***Complete #3**

1 2*more* (single) (twin)

7. Diabetic: (*Circle one only*)

Yes No Unknown

8. Family NTD History: (*Circle one only*)

Yes No Unknown

CHEMISTRY TEST LIST

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Acetaminophen	1 mL serum	Adult: 10 – 20 µg/mL	1 day	
Alanine Aminotransferase Reflection Spectrophotometry	1 mL serum Refrigerated	Male: 21 – 72 U/L Female: 9 – 52 U/L	1 day	
Albumin Reflection Spectrophotometry	1 mL serum Refrigerated	3.5 – 5.2 g/dL	1 day	
Alkaline Phosphatase Reflection Spectrophotometry	1 mL serum Refrigerated	38-126 U/L	1 day	
Alpha-Fetoprotein, Maternal Serum Chemiluminescent (DPC Immulite 2000)	2 mL serum Separate and freeze immediately. Ship Frozen.	See Triple Screen Profile interpretation.	3 days	Hemolyzed specimen or lack of patient demographic data are causes for rejection.
Alpha-Fetoprotein, Tumor Chemiluminescent (DPC Immulite 2000)	2 mL serum Separate and freeze immediately. Ship Frozen.	< 15 ng/mL	3 Days	Synonyms: AFP, Tumor Marker AFP, AFP Tumor Marker, 303 Hemolyzed specimens may be rejected. Used for the evaluation of hepatocellular, pancreatic and gastrointestinal carcinomas. Useful in differentiating neonatal hepatitis from biliary atresia in newborns.
Ammonia Reflection Spectrophotometry	1 mL heparinized plasma On ice up to 1 hour Frozen if more than 1 hour	9-33 mMol/L Critical: < 4.40 mMol/L > 43.0 mMol/L	1 day	Lab must be notified prior to drawing specimen. Specimen must be placed on ice immediately. Specimen will be rejected for = 2+ hemolysis
Amylase Serum Body Fluid Reflection Spectrophotometry	1 mL serum 1 mL body fluid Refrigerated	Serum: 30-110 U/L Critical: > 330 U/L Body Fluid: No established range	1 day	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Aspartate Aminotransferase Reflection Spectrophotometry	1 mL serum Refrigerated	5-40 U/L	1 day	Synonym: AST, SGOT
Beta hCG, qualitative Immunoassay	1 mL serum Refrigerated up to 48 hours Frozen if more than 48 hours	Negative	1 day	Results reported as "Weakly Positive" should be repeated after 72 hours have passed.
Beta hCG, quantitative Microparticle Enzyme Immunoassay	1 mL serum Refrigerated up to 24 hours Frozen if more than 24 hours	<5 mIU/mL (healthy, non-pregnant individuals) NOTE: Not performed on females if the Qualitative hCG is negative. Call lab if test must be performed even when the Qualitative hCG test is negative. Normal Pregnancy Ranges: Approximate Gestational Age — Approximate ß-HCG Range mIU/mL 3 - 4 weeks: 9 - 130 4 - 5 weeks: 75 - 2600 5 - 6 weeks: 850 – 20,800 6 – 7 weeks: 4,000 – 100,200 7 – 12 weeks: 11,500 – 289,000 12 – 16 weeks: 18,300 – 137,000 16 – 29 weeks (i.e., 2nd Trimester): 1,400 – 53,000 29 – 41 weeks (i.e., 3rd Trimester): 940 – 60,000	1 day	= 25 mIU/mL is the cutoff for a positive pregnancy.
Beta hCG, Triple Marker Profile Microparticle Enzyme Immunoassay	1 mL serum Refrigerated up to 24 hours Frozen if more than 24 hours	See ranges cited for Beta hCG, quantitative	3 – 5 days	
Beta hCG, Tumor Marker Microparticle Enzyme Immunoassay	1 mL serum Refrigerated up to 24 hours Frozen if more than 24 hours	< 2.0 mIU/mL	1 day	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Bilirubin, Direct Calculation	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	0.0-0.4 mg/dL	1 day	Protect samples from exposure to light
Bilirubin, Neonatal Reflection Spectrophotometry	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs Protect samples from exposure to light.	1.0 - 10.5 mg/dL Critical: > 15 mg/dL	1 day	Generally used for neonates under 15 days of age.
Bilirubin, Total Dual Wavelength Colorimetry	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs Protect samples from exposure to light.	0 - 1.3 mg/dL Critical: > 15.0 mg/dL	1 day	Generally <u>not</u> used for neonates under 14 days of age.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Blood Gas Electrode Measurement	0.50 mL heparinized whole blood (arterial, venous or capillary) Lab should be notified prior to drawing specimen.	pH-arterial 7.35-7.45 -capillary 7.31-7.41 Critical < 7.2 or > 7.6 pO_2-arterial 83-108 mm Hg Critical-arterial < 40 mm Hg or > 111 mm Hg pCO_2-arterial 35-45 mm Hg -capillary 41-51 mm Hg Critical < 20 or > 70 mm Hg TCO_2-arterial 23-27 mMol/L -venous 24-29 mMol/L Base Excess -2 to +3 mMol/L -capillary -4.0 to +4.0 mMol/L Bicarbonate 22-26 mEq -capillary 23-28 mEq O_2 Saturation-arterial 95-98% -capillary 80-100% Venous : No established range	30 minutes	Includes: pH, pO_2, pCO_2, TCO_2, Base Excess, Bicarbonate, O_2 Saturation
BUN Reflection Spectrophotometry	1 mL serum Refrigerated	M: 9-21 mg/dL F: 7-18 mg/dL	1 day	Synonym: Urea Nitrogen
Calcium Reflection Spectrophotometry	1 mL serum Refrigerated	8.5-10.2 mg/dL Critical: < 67 mg/dL or > 13 mg/dL	1 day	
Calcium, ionized Electrode Measurement	0.50 mL heparinized whole blood (arterial, venous or capillary) In ice water for up to 2 hours Lab should be notified prior to drawing specimen.	1.12-1.32 mMol/L Critical: < 0.7582 or > 1.5855 mMol/L	30 minutes	Synonym: Ca++

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Carbamazepine Fluorescence Polarization Immunoassay	1 mL serum Refrigerated	Therapeutic: 8-12 µg/mL Critical: > 15 µg/mL	1 day	Synonym: Tegretol
Carboxyhemoglobin Spectrophotometry	0.50 mL heparinized whole blood (arterial, venous or capillary) In ice water for up to 2 hours Lab should be notified prior to drawing specimen.	tHb M: 13.5-18.0 g% F: 12.0-16.0 g% Newborn: 14.0-22.0 g% Critical M: < 6.6 or > 19.9 g% F: < 6.6 or > 19.9 g% Newborn: < 9.5 or >22.3 g% HbO_2 Sat 91.9-98.5 % HbCO Non-Smokers: < 1.5% Smokers: 1.5-5.0% Heavy Smokers: 5.0-9.0% Critical Non-Smokers: > 10% HbO_2 94-100% MetHb < 1.5% Critical: = 10% O_2ct 15-23 vol% O_2cap 17.6-23.6 vol% RHb 0-5%	30 minutes	Includes: tHb, HbO_2 Sat, HbCO, HbO_2, MetHb, O_2ct, RHb
Carcinoembryonic Antigen (CEA) Chemiluminescent (DPC Immulite 2000)	2 mL serum Frozen	Non-smokers: <3.0 ng/mL Smokers: <5.0 ng/mL Non-diagnostic borderline: 5 –10 ng/mL	7 Days	Specimen may be rejected due to hemolysis. 4.4% of "healthy" smokers have values between 5 and 10 ng/mL; 5-10 ng/mL is a non-diagnostic, borderline range.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Chem 12 See individual analytes	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	See individual analytes	1 day	Includes: Glucose, Potassium, Total Protein, Sodium, AST, BUN, Alkaline Phosphatase, Albumin, Total Bilirubin, Calcium, Chloride, Creatinine
Chem 7 See individual analytes	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	See individual analytes	1 day	Includes: Glucose, BUN, Creatinine, Sodium, Potassium, Chloride, CO_2, Anion gap, BUN/Creatinine ratio
Chloride Direct Potentiometry	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	98-107 mMol/L Critical: < 80 or > 120 mMol/L	1 day	
Cholesterol, HDL Precipitation of non HDL fraction with Dextran Sulfate and magnesium chloride. Enzymatic	2 mL serum, Fasting Refrigerated	High risk: < 40 mg/dL Desirable: > 60 mg/dL	5 Days	Synonyms: Alpha Lipoprotein Cholesterol, HDL Cholesterol. Grossly hemolytic specimens will be rejected. Lipemic specimens may be rejected.
Cholesterol, Low Density Lipoprotein Calc	Calculation	LDL cholesterol ranges: Adults: Optimal: <100 mg/dL Near or Above Optimal: 100 – 129 mg/dL Borderline High: 130 – 159 mg/dL High: 160 – 189 mg/dL Very High: >190 mg/dL Calculating LDL cholesterol: LDL = Chol – HDL – (Trig/5)	5 days	LDL, Low Density Note: LDL calculations are not reliable if Triglyceride concentration is > 400 mg/dL or if Trig and cholesterol concentrations are both elevated, suggesting type III hyperlipoproteinemia.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cholesterol, Total Enzymatic determination (Vitros 250)	2 mL serum preferred Fasting 12-14 hours Refrigerated	<200 mg/dL - Desirable 200-239 mg/dL - Borderline >240 mg/dL - High	5 Days	Extremely lipemic specimens cannot be run. Non fasting specimens may be rejected. Used in the evaluation of potential risk factors for coronary artery disease (HDL cholesterol and triglycerides also required). Patient must be fasting for 12 hours for accurate results.
CK-MB Reflection Spectrophotometry	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	< 10 U/L Critical: > 16 U/L	1 day	
CK-MB Panel Reflection Spectrophotometry	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	See individual analytes	1 day	Includes: CK, CK-MB, %CK-MB (calculation CK-MB/CK)
CO_2 Reflection Spectrophotometry	1 mL serum Refrigerated	22-30 mMol/L Critical: < 10 or > 40 mMol/L	1day	Synonym: Carbon Dioxide
Creatine Kinase Reflection Spectrophotometry	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	M: 55-170 U/L F: 30-135 U/L Critical M: > 375 U/L F: > 230 U/L	1 day	Synonym: CK
Creatinine Colorimetric Rate Change	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	0.7-1.5 mg/dL Critical < 0.2; > 5.0 mg/dL	1 day	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Creatinine Clearance Colorimetric Assay	50 - 100 mL of a 24 Hour Urine Refrigerate. Record urine total volume and patient's height and weight. *Must be accompanied by a serum sample	61-166 mL/min	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Also note patient Height and Weight which are required for clearance calculation. Deliver to laboratory within 24 hours of collection. Collect a serum sample during collection of 24 hr. urine.
CRP (C-Reactive Protein)	1 mL serum	< 5 mg/dL	1 day	Used to assess monitor patients after surgery or other invasive procedures to detect the presence of an infection during the recovery period or to assess how active an inflammation is and to monitor treatment of an inflammation producing disease. **DO NOT USE FOR** coronary disease risk assessment

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
CRP, Ultra Sensitive (hsCRP)	1 mL serum	Low Risk: 1.0 – 2.9 mg/L Elevated Risk: 3.0 – 10 mg/L	3 - 5 days	Results greater than 10 mg/L should be evaluated for an ongoing "non-cardiac" inflammatory process. Restrictions for the test are as follows: CRP Ultra sensitive testing should be used when other major cardiac disease risk factors are present to further assess the patient's absolute risk of coronary disease. **HOWEVER**, the test **SHOULD NOT BE USED** in LOW or HIGH risk patients, i.e., **DO NOT TEST** patients without other coronary disease risk factors and **DO NOT TEST** patients with peripheral vascular disease or established/known coronary disease. CRP is most useful in assessing the absolute risk of coronary disease in those patients with known moderate risk, e.g., two or more known cardiac disease risk factors.
Digoxin Microparticle Enzyme Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	0.6-2.2 ng/mL Critical: > 3.0 ng/mL	1 day	
Drugs of Abuse Screen (See Urine Drug Screen)				
Electrolytes See individual analytes	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	See individual analytes	1 day	Includes: Sodium, Potassium, Chloride, CO_2, Anion gap

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Estradiol, Total Chemiluminescent (DPC Immulite 2000)	2 mL serum, no preservative or anticoagulant, Red top tube. Frozen	Male: 8-36 pg/mL Female: Follicular 10-90 pg/mL Mid-Cycle 100-500 pg/mL Luteal 50-240 pg/mL Postmenopausal 0-30 pg/mL	7 Days	Used in the evaluation of menstrual or infertility problems in females and gynecomastia/feminization syndromes in males and prepubertal females. In some cases it is also used to follow the effectiveness of therapy for ovulation induction. Limitations: Clomiphene increases and oral contraceptives decrease serum values. This assay has a limit of detection and thus lacks precision below 40 pg/mL. This laboratory has a policy of not reporting any value lower than the lowest standard. Therefore, abnormally low values for this assay can not be measured for any patient other than females in mid-cycle or luteal phase of menses.
Ethanol Radiative Energy Attenuation	1 mL whole blood in sodium fluoride Refrigerated	< 13 mg/dL	1day	
Ethanol (Legal Blood Alcohol Test)	7 mL whole blood in sodium fluoride	< 0.013% (w/V) – not detectable < 0.05% (w/V) – not under the influence 0.05 – 0.10% (w/V) – impaired (DUI) > 0.10% (w/V) – intoxicated (DWI) > 0.30 (w/V) – toxic	3 – 5 days	See USAREUR Regulation 40-160 for guidelines on submission

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Ferritin ECL Immunoassay	2 mL serum Frozen	Female: Pre Menopausal: 5-96 ng/mL Post Menopausal: 5-277 ng/mL Male: 20 - 250 ng/mL Female: 10 - 120 ng/mL	7 Days	< 10 ng/mL may indicate iron deficiency. Ferritin correlates directly with storage iron levels.
Fetal Lung Maturity (FLM) Fluorescent Polarization	1 mL amniotic fluid Protect from light and transport to lab immediately. Samples can be stored at 2 – 8°C up to 72 hours prior to testing or can be frozen at -10°C or colder and tested within 72 hours. Lab must be notified prior to drawing specimen.	= 39 mg/G – Immature 40 - 54 mg/G – Indeterminate = 55 mg/G - Mature	1 day	Test performed at University of Homburg.
Free Estriol Competitive Immunoassay	2 mL serum separate and freeze immediately		3 Days	Specimen may be rejected due to hemolysis. Reference ranges used for triple screen evaluation are not established for this application. All raw data in ng/mL is compared to the gestational age medians established and validated through a preliminary study through AFP prenatal software.
Free Thyroxine, FT4 Chemiluminescent (DPC Immulite 2000)	2 mL serum Frozen	0.8-2.0 ng/dL	7 Days	
Gamma Glutamyl Transferase Reflection Spectrophotometry	1 mL serum Refrigerated	8-78 U/L	1 day	Synonym: GGT

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Gentamicin Peak Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs Draw sample 30 to 60 minutes after the end of a 30 minute infusion	5-12 µg/mL Critical: > 12 µg/mL	1 day	
Gentamicin Trough Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs Draw sample immediately before dosing	< 2 µg/mL Critical: > 2 µg/mL	1 day	
Glucose Reflection Spectrophotometry	1 mL serum, plasma (heparin or sodium fluoride), body fluid, or cerebrospinal fluid Refrigerated up to 48 hrs Frozen if more than 48 hrs	Serum or plasma: Fasting or Random: 65-110 mg/dL ½ hour: 110-170 mg/dL 1 hour: 120-170 mg/dL 2 hour: 70-120 mg/dL 3 hour: 70-105 mg/dL 4 hour: 70-105 mg/dL 5 hour: 70-105 mg/dL 2 hour PP: < 120 mg/dL Critical: < 50 or > 400 mg/dL CSF: 40-70 mg/dL Critical: < 38.70 or > 198.00 mg/dL Body fluid: No established range	1 day	All timed draw ranges are for non-pregnant adults based on 75-100g glucose load.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Hemoglobin AIC, Glycosylated HGB HPLC	2 mL whole blood in EDTA Refrigerated	3.8% - 6.6%	14 Days	Synonyms: Glycosylated hemoglobin, HGB A1C, GHB, HB A1C, A1C, Glycohemoglobin Conditions leading to shortened red cell survival cause falsely decreased values. Presence of Hemoglobin F decreases values. Unable to quantitate in presence of Hemoglobin C. Values greater than 10% may indicate presence of a hemoglobin variant.
HRA Cholesterol Reflection Spectrophotometry	1 mL serum Refrigerated	Desirable: < 200 mg/dL High: ≥ 240 mg/dL	1 day	HRA=Health Risk Assessment
Iron/TIBC Colorimetric Assay	3 mL serum Refrigerated	Serum Iron: Adult Male 70-180 µg/dL Adult Female 60-180 µg/dL Child 50-120 µg/dL Infant 40-100 µg/dL Newborn 95-225 µg/dL TIBC: Adult 250-450 µg/dL	7 Days	Hemolyzed specimens are rejected.
Lactate	1 mL NaF plasma (gray top) Place on ice and deliver to the laboratory immediately after collection.	All: 0.7 – 2.1 mmol/L	1 day	Tube must be completely filled, placed on ice, and delivered to the laboratory immediately as the tube must be spun and the plasma separated within 15 minutes of the draw time.
Lactate Dehydrogenase Reflective Spectrophotometry	1 mL serum Refrigerated	8-78 U/L	1 day	Synonym: LDH

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
LH/FSH Chemiluminescent (DPC Immulite 2000)	3 mL serum Frozen	LH Reference range: Male: 1.5 – 2.9 mIU/mL Female: Follicular phase: 1.8 – 13.4 mIU/mL Mid-cycle: 15.6 – 78.9 mIU/mL Luteal: 0.7 – 9.4 mIU/mL Post-menopausal: 10.8 – 61.4 mIU/mL FSH Reference ranges Male: 1 –14 mIU/mL Female: Follicular phase: 1 –14 mIU/mL Mid cycle: 8 –22 mIU/mL Luteal phase: 2 –12 mIU/mL Post menopausal: 35 – 151 mIU/mL	7 Days	Synonyms: Follicle stimulating hormone, luteinizing hormone, Gonadotropins Due to the pulsatile secretion of FSH/LH in the hypothalamus, samples obtained within the same day from the same patient may fluctuate widely within the reference range. For diagnostic purposes, results should be used in conjunction with other data.
Lipase Enzymatic Reflection density	1 mL serum Refrigerated	23-300 U/L	1 day	
Lipid Profile Enzymatic	2 -5 mL serum 12-14 hour fasting required Refrigerated	See individual tests (Trig, Chol, HDL, LDL)	5 Days	Frozen and extremely lipemic specimens may be rejected. Non-fasting patients are unacceptable. Unable to calculated LDL if Triglyceride value is > 400 mg/dL. Profile includes: Total Cholesterol, Triglyceride, HDL Cholesterol, and LDL Cholesterol

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Lipid Screen See individual analytes	1 mL serum 12-14 hour fasting required Refrigerated	See individual analytes	1 day	Includes: Cholesterol and Triglyceride Patient should fast 12-14 hours prior to drawing (during fasting, the consumption of only water is allowed; NO food consumption, to include coffee or tea, is allowed)
Lithium Reflective Spectrophotometry	1 mL serum Refrigerated	Therapeutic: 0.6-1.2 mMol/L Critical: > 2.5 mMol/L	1 day	
Liver Panel See individual analytes	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	See individual analytes	1 day	Synonym: Liver function tests (LFT), Hepatic panel. Includes: Albumin, ALT, AST, Alkaline Phosphatase, Total Bilirubin
Magnesium Reflective Spectrophotometry	1 mL serum Refrigerated	1.7-2.2 mg/dL Critical: < 1 and > 4.65 mg/dL	1 day	
Osmolality Freezing Point Depression	1 mL serum 1 mL urine, random or 24 hour Refrigerated if more than 2 hrs	Serum: 275-295 mOsm/kg Random Urine: 50-1400 mOsm/kg 24 hour Urine: 300-900 mOsm/kg	1 day	
pH Body Fluid Color indicator	Any body fluid	No established ranges	1 day	
pH Gastric Color indicator or electrode measurement	Gastric fluid	No established range	1 day	
Phenobarbital Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	Therapeutic: 15-30 µg/mL Critical: > 40 µg/mL	1 day	Synonym: Barbital
Phenytoin Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	Therapeutic: 10-20 µg/mL Critical: > 20 µg/mL	1 day	Synonym: Dilantin
Phosphate, Inorganic Reflection Spectrophotometry	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	2.5-4.5 mg/dL Critical < 1or > 8 mg/dL	1 day	Synonym: Phosphorus

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Potassium Direct Potentiometry	1 mL serum Refrigerated up to 48 hrs Frozen if more than 48 hrs	3.6-5.0 mMol/L Critical: < 2.8 or > 6.2 mMol/L	1 day	
Progesterone Chemiluminscent (DPC Immulite 2000)	2 mL serum Frozen	Males and non-menstruating females: 0.13 – 0.97ng/mL Female: Follicular 0.15 – 0.70 ng/mL Luteal 2 - 25 ng/mL	7 Days	Synonyms: PRG
Prolactin Chemiluminescent (DPC Immulite 2000)	2 mL serum Frozen	Male: 2 – 14.7 ng/mL Female: 2.6 – 23.2 ng/mL Post-menopausal females 1.8 – 18 ng/mL	7 Days	Synonyms: PRL List patient medications. A multitude of drugs increase or decrease levels.
Prostatic Specific Antigen (PSA) Chemiluminescent (DPC Immulite 2000)	2 mL serum Separate and freeze immediately	< 4.0 ng/mL	7 Days	Specimen may be rejected if not frozen or if marked hemolysis is present. Patients treated with preparations of mouse monoclonal antibodies may show falsely elevated or depressed values.
Protein Electrophoresis (serum) Electrophoresis	2 mL serum Refrigerated or Frozen	Total protein: 6.5 – 8.5 g/dL Albumin: 3.8 – 6.2 g/dL Alpha 1: 0.06 – 0.45 g/dL Alpha 2: 0.5 – 1.2 g/dL Beta: 0.3 – 1.0 g/dL Gamma: 0.4 – 1.5 g/dL	14 Days	Synonyms: SPEP, Serum Protein electrophoresis, IEP, Immunoelectrophoresis, Immunofixation
Protein Electrophoresis (urine) Electrophoresis	50 to 100 mL aliquot of a 24 Hour urine. Boric acid should be used as preservative (250 mg/L urine). Frozen	Reference ranges are not yet established for this test.	14 Days	Synonyms: UPEP, Urine Protein Electrophoresis, Immunofixation, Immunoelectrophoresis, IEP Not performed if total protein is < 14 mg/dL. Serum protein electrophoresis should accompany request.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Salicylate Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	Therapeutic: 150-300 mg/L Critical: > 300 mg/L	1 day	Synonym: Aspirin
Sodium Direct Potentiometry	1 mL serum Refrigerated	137-145 mMol/L Critical: < 120 or > 150 mMol/L	1 day	
Testosterone ECLIA	2 mL serum Refrigerated or Frozen	Adult Male: 360-990 ng/dL Adult Female: 15-110 ng/dL	7 Days	Synonyms: Total Testosterone
Theophylline Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	Therapeutic: 8-20 µg/mL Critical: > 20 µg/mL	1 day	
Total Protein Reflection Spectrophotometry	1 mL serum 1 mL body fluid 1 mL cerebrospinal fluid Refrigerated up to 48 hrs Frozen if more than 48 hrs	Serum: 6.3-8.2 g/dL CSF: 12-45 mg/dL Critical: > 45 mg/dL Body fluid: No established range	1 day	
Triglycerides Reflection Spectrophotometry	1 mL serum 12-14 hour fasting required Refrigerated	Male: 40-160 mg/dL Female: 35-135 mg/dL	1 day	Patient should fast 12-14 hours prior to drawing (during fasting, the consumption of <u>only</u> water is allowed; NO food consumption, to include coffee or tea, is allowed)
Triglycerides Enzymatic	2 mL serum Refrigerated	Male: 40-160 mg/dL Female: 35-135 mg/dL	5 Days	Extremely lipemic specimens will be rejected.
Triiodothyronine, T3 Chemiluminescent	2 mL Serum Frozen	0.8-1.6 ng/mL	7 Days	Synonyms: T3 Total, T-3 Total, Total T3
Triple Marker Profile	See specimen requirements for: MSAFP, Free Estriol, and hCG (Triple Marker Profile).		3 – 5 days.	
TSH ECLIA	2 mL serum Frozen	0.32 - 4.0 µIU/mL	7 Days	Synonyms: Thyroid screen, FT4, TFT, Thyroid Panel FT4 will be automatically added on patient samples when TSH values falls outside reference range if the provider has not requested this assay.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Uric Acid Reflection Spectrophotometry	1 mL serum Refrigerated	2.5-8.5 mg/dL	1 day	
Valproic Acid Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs	Therapeutic: 50-100 µg/mL Critical: > 100 µg/mL	1 day	Synonym: Depakene
Vancomycin Peak Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs Draw sample 30 to 60 minutes after the end of a 30 minute infusion.	Therapeutic: 20-40 µg/mL Critical: > 40 µg/mL	1 day	
Vancomycin Trough Fluorescence Polarization Immunoassay	1 mL serum Refrigerated up to 24 hrs Frozen if more than 24 hrs Draw sample immediately before dosing.	Therapeutic: 5-10 µg/mL Critical: > 10 µg/mL	1 day	
Vitamin B12, Folate Chemiluminescent	2 mL serum Refrigerated Specimen must be protected from light.	Vitamin B12: 234 – 894 pg/mL Folate: 3 – 15 ng/mL	7 Days	Hemolyzed specimens will be rejected.

CHEMISTRY TEST LIST (CONTINUED) – URINALYSIS AND URINE CHEMISTRY

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Acetone Acetest (Colorimetric)	1 mL urine Refrigerate	Negative Critical: Large	1 day	
Bilirubin Ictotest Colorimetric	1 mL urine Refrigerate	Negative	1 day	
Glucose Dipstick	1 mL urine Refrigerate	Negative	1 day	May be ordered at timed intervals to coincide with Glucose Tolerance testing
Microalbumin (Qualitative) Monoclonal Antibody	5 mL urine Specimen must be a first morning urine collection.	Negative	1 day	Patients should be in a well-hydrated condition for 1-2 days prior to sample collection. Patients should consume 1.5 to 2 liters of fluid per day to ensure adequate hydration. A very low or very high fluid intake can lead to erroneous results.
Protein Sulfosalicylic Acid	2 mL urine Refrigerate	Negative Critical: 4+ (> 1000 mg/dL)	1 day	
Reducing Substances Copper Reduction	1 mL urine 1 mL feces Refrigerate	Negative Critical: 4+	1 day	Synonym: Clinitest
Specific Gravity Refractometer	1 mL urine Refrigerate	Random: 1.002-1.030 24 hour: 1.015-1.025	1 day	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Urinalysis Dipstick and Microscopic	10 mL urine Refrigerate	Dipstick: Color: Colorless-Amber Appearance: Clear Specific Gravity: 1.005-1.030 pH: 5-9 Glucose: Negative Bilirubin: Negative Ketone: Negative Blood: Negative Protein: Negative Urobilinogen: 0.1-1.0 EU/dL Nitrite: Negative Leukocytes: Negative Microscopic: WBC: 0-5/hpf RBC Male: 0-2/hpf, Female: 0-5/hpf	1 day	Microscopic performed if requested and automatically when Blood = small, Protein = 30 mg/dL, Nitrite is positive, or Leukocyte is positive
Urine Calcium Colorimetric Assay	50 - 100 mL of a 24 Hour Urine Refrigerate. DO NOT FREEZE. Record urine total volume.	100-300 mg/24 hrs	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection.
Urine Creatinine Colorimetric Assay	50 - 100 mL of a 24 Hour Urine Refrigerate. Record urine total volume.	800-2800 mg/24 hrs	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection.
Urine Drug Screen Competitive Binding Immunoassay	1 mL urine Refrigerated up to 48 hrs Frozen if more than 48 hrs	Negative	1 day	Includes: Amphetamine/Methamphetamine, Barbiturate, Benzodiazepine, Cocaine, Methadone, Opiate, THC, TCA

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Urine Phosphorus Colorimetric Assay	50 - 100 mL of a 24 Hour Urine Refrigerate. Record urine total volume.	400-1300 mg/24 hrs	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection.
Urine Potassium Potentiometric	50 - 100 mL of a 24 Hour Urine Refrigerate. Record urine total volume.	25-125 mmol/24 hrs Random Urine: Reference Range not yet established.	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection.
Urine Sodium Potentiometric	50 - 100 mL of a 24 Hour Urine Refrigerate. Record urine total volume.	40-220 mmol/24 hrs Random Urine: 30 – 90 mMol/L	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection.
Urine, Total Protein Colorimetric Assay	50 - 100 mL of a 24 Hour Urine Freeze if testing is delayed more than 24 hours. Record urine total volume.	1 – 14 mg/dL 30-120 mg/day (Protein concentration (mg/dL) X 24-hour volume (dL) = mg/day	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection. NOTE: Specimens should not be collected after intense physical exertion or acute fluid load or deprivation.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Urine, Urea Nitrogen Colorimetric Assay	50 - 100 mL of a 24 Hour Urine Refrigerate. Record urine total volume.	12,000-20,000 mg/24 hrs	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection.
Urine Uric Acid Colorimetric Assay	50 - 100 mL of a 24 Hour Urine Refrigerate. Record urine total volume.	250-750 mg/24 hrs	3 Days	Have patient void and discard first morning urine. Collect all urine for next 24 hours and add to container. Refrigerate container during collection. Note date and time of collection on container. Deliver to laboratory within 24 hours of collection.

10. **HEMATOLOGY (CORE LABORATORY)**

a. General Information. The Hematology section (Core Laboratory) is located on the second floor in the laboratory complex in Building 3711. Normal duty hours for section personnel are 0730-1630, Monday through Friday. The section operates at a reduced staffing level to handle critical testing requirements from 1630-0730, Monday through Friday and on weekends, training holidays, and holidays. It is necessary to stress that routine priority specimens submitted during reduced staffing times may be processed and stored, dependent on the amount of critical workload present, until the test(s) can be performed during normal duty hours.

b. Problems, complaints or questions should be directed through the section, to the Chief, Core Laboratory (486-8185) or the Medical Director, Clinical Pathology.

c. Routine tests available in the Hematology section include the following:

(1) CBC

(2) Differential

(3) Modified Westergren Sedimentation Rate (ESR)

(4) Reticulocyte Count

(5) G6PD, Qualitative

(6) Spun Hematocrit

(7) Cell Saver Panel

(8) Eosinophil Count on Nasal Smears, Urine and Blood

(9) Fetal Hemoglobin (Kleihauer-Betke)

(10) Cell counts on Body Fluids to include differential (cytospin)

(11) Semen Analysis (Post Vasectomy or Fertility Studies) - Appointments must be made by contacting the laboratory's Front Desk at 486-7500. Semen analyses are performed on Tuesdays and Wednesdays only. No specimen will be accepted after 1030 hours on these two days.

(12) Bone Marrow Prep - Arrangements must be made with the Hematology Section (486-7511)

d. All lavender top tubes submitted must be free of clots. If clots are present, the specimen will be rejected.

e. Coagulation Testing.

(1) Coagulation testing is used to determine the clotting properties of blood. All Blue top tubes will be checked for clots. If clots are present, the specimen will be rejected. Routine coagulation tests include:

(a) Prothrombin Time (PT): PT is used to monitor patients on oral anticoagulant therapy (coumadin or warfarin).

(b) Activated Partial Thromboplastin Time (aPTT): This test is used to monitor the effectiveness of unfractionated heparin therapy. As the level of heparin in the blood increases, the length of time required for

specimens to clot also increases. (Note: Fractionated heparin or Low Molecular Weight heparin is monitored by a Factor Xa inhibition test (a non-routine coagulation test), and not the aPTT).

(c) Fibrinogen: Fibrinogen is a protein that is produced by the liver and circulates in the blood stream. In the presence of thrombin, an enzyme produced by the activation of the clotting mechanism, fibrinogen is cleaved into fibrin. Fibrin is an insoluble protein responsible for clot formation. This coagulation test is used to diagnose dysfibrinogenemia, unexplained excessive bleeding, and to distinguish between acquired or inherited deficiencies of fibrinogen.

(d) D-Dimer: Tests for fibrin degradation products circulating in the blood in response to clot (thrombus) formation and breakdown. Results can be elevated due to DVT, DIC, or other disease processes.

(e) Mixing Studies: Contact personnel in the Hematology section prior to ordering a mixing study; this test must be pre-approved by a Pathologist.

(2) Coagulation Specimen Collection Guidelines. The purpose of this paragraph is to outline the proper steps to be taken when collecting a patient's coagulation specimen. Wards and clinics may collect patient blood specimens for coagulation testing. Good laboratory practice dictates specific collection methods for coagulation testing be employed to reduce the possibility of inaccurate results.

(a) Materials Required: Appropriate phlebotomy tubes, Vacutainer holder or syringe, 2 X 2 gauze, safety needles, a tourniquet (if necessary), skin prep pad, appropriate PPE, blood collection kit (if patient has an indwelling catheter).

(b) Procedure:

[1] The National Committee on Clinical Laboratory Standards (NCCLS) recommends that blood specimens for coagulation testing be collected by venipuncture using a blood collection system that collects the specimen *directly* into a tube containing anticoagulant.

[2] Patients with no indwelling catheter: When collecting blood from a patient with no indwelling catheter, follow normal phlebotomy procedures.

[a] If multiple specimens are collected, the order of draw should be as follows:

{1} Blood Culture tube

{2} Coagulation tube (e.g., blue closure)

{3} Serum tube with or without clot activator, with or without gel (e.g., red closure)

{4} Heparin tube, with or without gel plasma separator

{5} EDTA (e.g., lavender closure)

{6} Glycolytic inhibitor (e.g., gray closure)

[b] If only a routine coagulation specimen is to be drawn [i.e., Protime (PT), Partial Thromboplastin Time (PTT), Activated Partial Thromboplastin Time (APTT), and Fibrinogen], the coagulation specimen may be the first tube drawn. New recommendations do not require that a discard tube be drawn prior to the coagulation tube. <u>This is not true for coagulation specimens drawn from an in-dwelling catheter</u> (see below).

[c] However, for non-routine, special coagulation tests (i.e., tests for abnormalities in certain clotting factors, for example, Factor VIII, Factor X) a discard tube is necessary. To do this, collect a small volume of blood (approximately 3-5 mL) in a separate blood tube. After collecting the discard tube, collect the coagulation specimen. The discard tube specimen should not be used for testing**.

[d] Once the specimen has been collected, the collection tube should be gently inverted at least four times to allow the anticoagulant to mix with the blood.

[3] Patients with an indwelling catheter:

[a] Under certain circumstances, blood specimens for coagulation testing may be drawn from an indwelling catheter using a blood collection system or a syringe.

[b] When obtaining a blood specimen from a catheter, the components of the blood collection system (the catheter, luer lock, syringe, needle, and collection device) should be checked for compatibility. This will avoid air leaks that may lead to specimen hemolysis and incorrect draw volumes.

[c] Collection of the blood through lines that have been previously flushed with heparin should be avoided if possible.

[d] If the blood must be drawn through an indwelling catheter, and the catheter has been flushed with a heparin solution, possible heparin contamination and specimen dilution should be considered and the line should be flushed with a minimum of 5 mL of saline (0.9% saline solution containing no heparin). The first 5 mL of blood (or 6 dead space volumes) should not be used for laboratory analysis as it may contain some of the saline flush.

[e] Even if no heparin has been used in the catheter, and it is filled with saline, the first 5 mL of blood (or 6 dead space volumes) should not be used for laboratory analysis as it may contain some of the saline solution.

[f] After the first 5 mL of blood have been removed, blood may be drawn into the coagulation tube.

[g] After the coagulation tube is filled, the tube should be mixed by gentle inversion at least 4 times.

[h] If multiple specimens are collected, the coagulation specimen should be collected in the second or third tube. The appropriate order of draw should be:

{1} Blood culture tubes or blood culture vials/bottles

{2} Coagulation tube (e.g., blue closure)

{3} Serum tube with or without clot activator, with or without gel (e.g., red closure)

{4} Heparin tube, with or without gel plasma separator

{5} EDTA (e.g., lavender closure)

{6} Glycolytic inhibitor (e.g., gray closure)

[i] If only a routine coagulation specimen is needed, a discard tube should be used. To do this, collect a small volume of blood (approximately 3-5 mL) in a separate blood tube. After collecting the discard tube, collect the coagulation specimen. The discard tube specimen should be a nonadditive or a coagulation tube and should not be used for testing.

(c) Unacceptable specimens: the following specimens are unacceptable for analysis:

[1] Partially filled tubes

[2] Specimens with visible hemolysis or lipemia

[3] Samples collected in the wrong tube

[4] Samples that are clotted. Check the whole blood for clot formation by gentle inversion.

[5] Samples that lack patient information (name, FMP, Sponsor's SSN)

(d) Specimens should be brought to the main laboratory within 60-90 minutes of draw time. Ensure that the proper orders have been placed into the CHCS system *before* bringing the specimen to the laboratory. The laboratory cannot accept patient specimens without associated orders.

(e) All blue tope tubes submitted for coagulation studies must be completely full. This will ensure a proper blood to anticoagulant ratio. If the blue top tubes are not adequately filled when received, the specimen will be rejected.

f. STAT tests available in the Hematology section include the following:

(1) CBC, not to include a manual differential which may require a pathologist review

(2) PT

(3) APTT

(4) Fibrinogen

(5) D-Dimer test

(6) CSF with differential

g. ASAP tests available in the Hematology section include the following:

(1) CBC

(2) Differentials – both blood and body fluids

(3) Fibrinogen

(4) D-Dimer test

(5) PT

(6) APTT

h. Pre-op tests for Hematology testing should be requested on an "ASAP" or "routine" priority, except for true emergency surgical procedures which require STAT testing. Pre-op requests should be in the lab by 1400 hours the day prior to surgery. STAT requests for scheduled surgeries will not be honored and will be downgraded to ASAP without notification.

HEMATOLOGY TEST LIST

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Bone Marrow Prep Direct, Buffy layer, Touch, Fat & Perivascular layer preps are prepared.	Bone Marrow **By Appointment Only**		3 – 5 days.	Call 486-7511 to schedule an appointment.
CBC (Cell Blood Count, CBC/Diff Automatic) Instrumentation: Beckman Coulter LH750 Flow Cytometry	Whole Blood – EDTA Lavender top tube Refrigerated Ship on ice (Do not freeze).	**WBC**: unit of measure: K/cmm Birth: 9.0 – 30.0 1 – 6 days: 9.4 – 34.0 1 week – 1 month 5.0 – 21.0 1 – 6 months 5.0 – 19.5 6 – 12 months 6.0 – 17.5 1 – 5 yrs. 6.0 – 17.5 6 – 11 yrs. 5.0 – 14.5 12 – 18 yrs. 4.5 – 13.5 Adult 3.5 – 10.5	8 Hrs.	
		RBC: unit of measure: M/cmm Birth: 3.9 – 5.4 1 – 6 days: 4.0 – 6.6 1 week – 1 month 3.9 – 6.3 1 – 6 months 3.0 – 5.4 6 – 12 months 3.1 – 4.5 1 – 5 yrs. 3.7 – 5.4 6 – 11 yrs. 3.9 – 5.3 12 – 18 yrs. 4.0 – 5.2 Adult Male 4.4 – 5.7 Adult Female 3.7 – 5.3	8 Hrs.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
		Hemoglobin: unit of measure: g/dL Birth: 13.5 – 19.5 1 – 6 days: 14.5 – 22.5 1 week – 1 month 13.5 – 21.5 1 – 6 months 10.0 – 18.0 6 – 12 months 9.5 – 13.5 1 – 5 yrs. 10.5 – 13.5 6 – 11 yrs. 11.5 – 13.5 12 – 18 yrs. 11.5 – 13.5 Adult Male 13.2 – 17.1 Adult Female 11.0 – 16.0	8 Hrs.	
		Hematocrit: unit of measure: % Birth: 42 - 60 1 – 6 days: 45 - 67 1 week – 1 month 42 - 66 1 – 6 months 31 - 55 6 – 12 months 29 - 41 1 – 5 yrs. 33 - 39 6 – 11 yrs. 34 - 40 12 – 18 yrs. 35 - 45 Adult Male 38 - 50 Adult Female 34 - 47	8 Hrs.	
		MCV: unit of measure: fL Birth: 98.0 – 118.0 1 – 6 days: 95.0 – 121.0 1 week – 1 month 88.0 – 126.0 1 – 6 months 85.0 – 123.0 6 – 12 months 74.0 – 108.0 1 – 5 yrs. 70.0 – 86.0 6 – 11 yrs. 75.0 – 87.0 12 – 18 yrs. 77.0 – 95.0 Adult Male 80.0 – 95.0 Adult Female 80.0 – 99.0	8 Hrs.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
		MCH: unit of measure: pg Birth: 31 – 37 1 – 6 days: 31 – 37 1 week – 1 month 28 – 40 1 – 6 months 28 – 40 6 – 12 months 25 – 35 1 – 5 yrs. 23 – 31 6 – 11 yrs. 24 – 30 12 – 18 yrs. 25 – 34 Adult 26 - 33	8 Hrs.	
		MCHC: unit of measure: g/dL Birth: 30 – 36 1 – 6 days: 29 – 37 1 week – 1 month 28 – 38 1 – 6 months 29 – 37 6 – 12 months 30 – 36 1 – 5 yrs. 30 – 36 6 – 11 yrs. 31 – 37 12 – 18 yrs. 31 – 37 Adult Male 32 – 35 Adult Female 31 - 35	8 Hrs.	
		RDW: Unit of measure: % ALL: 12.6 – 15.9	8 Hrs.	
		PLATELET: unit of measure: K/cmm ALL: 151 – 356	8 Hrs.	
		MPV: unit of measure: fL ALL: 6.4 – 10.6	8 Hrs.	
		% Neutrophil: unit of measure: % ALL: 35 – 73	8 Hrs.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
		% Lymphocyte: unit of measure: % Child: 12 – 75 Adult 18 – 51	8 Hrs.	
		% Monocyte: unit of measure: % ALL: 1.0 – 12.0	8 Hrs.	
		% Eosinophil: unit of measure: % ALL: 0.0 – 8.0	8 Hrs.	
		% Basophil: unit of measure: % ALL: 0.0 – 2.0	8 Hrs.	
		Absolute Neutrophil: unit of measure: K/mcL Birth: 6.0 – 26.0 1 – 6 days: 5.0 – 21.0 1 week – 1 month 1.5 – 10.0 1 – 6 months 1.0 – 9.0 6 – 12 months 1.0 – 8.5 1 – 5 yrs. 1.5 – 8.5 6 – 11 yrs. 1.5 – 8.0 12 – 18 yrs. 1.8 – 8.0 Adult 1.6 – 6.5	8 Hrs.	
		Absolute Lymphocyte: unit of measure: K/mcL Birth: 2.0 – 11.0 1 – 6 days: 2.0 – 11.5 1 week – 1 month 2.0 – 17.0 1 – 6 months 2.5 – 16.5 6 – 12 months 4.0 – 13.5 1 – 5 yrs. 4.0 – 10.5 6 – 11 yrs. 1.5 – 7.0 12 – 18 yrs. 1.2 – 6.0 Adult 1.1 – 3.1	8 Hrs.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
		Absolute Monocyte: unit of measure: K/mcL Birth: 0.40 – 3.1 1 – 6 days: 0.20 – 3.1 1 week – 1 month 0.30 – 2.7 1 – 6 months 0.15 – 2.0 6 – 12 months 0.10 – 1.3 1 – 5 yrs. 0.05 – 1.1 6 – 11 yrs. 0.00 – 0.8 12 – 18 yrs. 0.00 – 0.8 Adult 0.2 – 0.8	8 Hrs.	
		Absolute Eosinophil: unit of measure: K/mcL Birth: 0.02 – 0.85 1 – 6 days: 0.05 – 1.00 1 week – 1 month 0.07 – 1.10 1 – 6 months 0.07 – 0.90 6 – 12 months 0.07 – 0.75 1 – 5 yrs. 0.05 – 0.70 6 – 11 yrs. 0.00 – 0.65 12 – 18 yrs. 0.00 – 0.55 Adult 0.00 – 0.60	8 Hrs.	
		Absolute Basophil: unit of measure: K/mcL Birth: 0.00 – 0.64 1 – 6 days: 0.00 – 0.30 1 week – 1 month 0.00 – 0.25 1 – 6 months 0.00 – 0.20 6 – 12 months 0.00 – 0.20 1 – 5 yrs. 0.00 – 0.20 6 – 11 yrs. 0.00 – 0.20 12 – 18 yrs. 0.00 – 0.20 Adult 0.00 – 0.10	8 Hrs.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cell Count, CSF Hemocytometer for count. Cytospin slide stained with Wright-Giemsa for differential.	CSF – centrifuge tube or sterile glass tube with screw cap. **All CSFs are considered STAT! Deliver to lab immediately**. Tube #3 should be submitted for cell count (Tube #1 to Chem./Serology and Tube#2 to Micro.)	CSF: *Color*: Colorless *Appearance*: Clear *Leukocyte Count (WBC):* Adults: 0-5 mononuclear cells/µL Neonates: 0-30 mononuclear cells/µL Children: intermediate values, 1 year old: <20/µL and <10/µL until adolescence. *WBC differential count:* Adults: Lymphocytes: 60% +/- 20% Monocytes: 30% +/- 15% Neutrophils: 2% +/- 4% Neonates: Lymphocytes: 20% +/- 15% Monocytes: 70% +/- 20% Neutrophils: 4% +/- 4% *Red Cells (RBC):* None seen *Crystals*: Not Tested	<1hr	**Call 486-7511 prior to submitting a CSF to Lab.** Analysis must occur immediately because granulocytes and RBC's lyse within one hour. All CSF body fluids will be reviewed by a pathologist.
Cell Count, Other Hemocytometer for count. Cytospin slide stained with Wright-Giemsa for differential. Microscopic observation for crystals.	Other Miscellaneous –EDTA Lavender top tube Ship at Room Temperature	Total cell count: ? 5 WBC cells/mm^3	8 Hrs.	Note: If specimen is clotted, a cell count will not be performed. A cytospin slide will be made and a cell differential performed. All serous fluids exhibiting a count of ?5 cells will have a manual differential performed.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cell Count, Pericardial Fluid Hemocytometer for count. Cytospin slide stained with Wright-Giemsa for differential. Microscopic observation for crystals.	Pericardial Fluid – EDTA Lavender top tube Ship at Room Temperature	Pericardial Fluid: *Color & Appearance*: Clear, pale yellow Total cell count: ? 5 WBC cells/mm^3	8 Hrs.	Note: If specimen is clotted, a cell count will not be performed. A cytospin slide will be made and a cell differential performed. All serous fluids exhibiting a count of ?5 cells will have a manual differential performed.
Cell Count, Peritoneal Fluid Hemocytometer for count. Cytospin slide stained with Wright-Giemsa for differential. Microscopic observation for crystals.	Peritoneal Fluid – EDTA Lavender top tube Ship at Room Temperature	Peritoneal Fluid: *Color & Appearance*: Clear, pale yellow Total cell count: ? 5 WBC cells/mm^3	8 Hrs.	Note: If specimen is clotted, a cell count will not be performed. A cytospin slide will be made and a cell differential performed. All serous fluids exhibiting a count of ?5 cells will have a manual differential performed.
Cell Count, Pleural Fluid Hemocytometer for count. Cytospin slide stained with Wright-Giemsa for differential. Microscopic observation for crystals.	Pleural Fluid – EDTA Lavender top tube Ship at Room Temperature	Pleural Fluid: *Color & Appearance*: Clear, pale yellow Total cell count: ? 5 WBC cells/mm^3	8 Hrs.	Note: If specimen is clotted, a cell count will not be performed. A cytospin slide will be made and a cell differential performed. All serous fluids exhibiting a count of ?5 cells will have a manual differential performed.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cell Count, Synovial Fluid Hemocytometer for count. Cytospin slide stained with Wright-Giemsa for differential. Microscopic observation for crystals.	Synovial fluid – EDTA Lavender top tube Minimum amount: 1 mL Ship at Room Temperature and deliver specimen to the laboratory within 1 hour of collection.	Synovial Fluid: *Color & Appearance:* Clear and Straw colored *Volume*: <3.5 mL *Leukocyte count (WBC)*: <180 mm3 *WBC differential count:* Polymorphonuclears: <25% Lymphocytes: <75% Monocytes: <70% *Viscosity*: Normal *Crystals*: Absent	8 Hrs.	For Cell Counts and Crystals, please deliver specimen within 1 hr. Delays will cause false decrease in cell count. Crystal examination must be performed immediately; changes in temperature and pH can affect crystal solubility producing erroneous results.
Cell Saver Panel **Order when Cell Saver is used for recycling blood during surgery.**	Plasma: EDTA tube; and Serum: Red Top Tube	None Established.	4 hours.	Panel includes: HCT, spun HCT, plasma Hgb, and visual assessment of the degree of hemolysis present in the plasma. Red top tube is sent for Gram stain and culture.
D-dimer test Latex Chromogenic Assay ACL 9000	Plasma light blue top tube (3.2% Sodium Citrate) If shipped, plasma must be separated within 15 minutes of collection and frozen.	Normal 0 – 254 ng/mL Abnormal = 255 ng/mL	8 Hrs.	Values above 255 ng/mL should be regarded as Positive.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Differential, Manual Wright-Giemsa Stain	Whole Blood – EDTA Lavender top tube Refrigerated Ship on ice (Do not freeze)	See CBC test for reference ranges.	8 hours	Manual differential is automatically performed when certain criteria are met.
Eosinophil Count Wright-Giemsa stain	Nasal mucus or Urine Nasal: Slide or nasal swab Urine: Sterile Urine container Ship urine on ice. Ship swab in appropriate culturette.	Mucus or Urine: Less than 5% Eosinophils	8 Hrs.	Nasal smears showing 20 – 30% may indicate an allergy. Swab must remain moist during transport. Dry swabs will be rejected.
Eosinophil Count - Blood Instrumentation: Beckman Coulter LH 750 Flow Cytometry	Whole Blood – EDTA Lavender top tube Refrigerated Ship on ice (Do not freeze).	Unit of measure: $10^3/\mu L$ Newborn <24 hrs old: 20 – 850 1 year old: 50 – 700 Adult: 0 - 450	8 Hrs.	
Erythrocyte Sedimentation Rate (ESR; Sed Rate) Diluted Westergren	Whole blood-EDTA Lavender tube Refrigerated Ship on ice (Do not freeze).	Male: 0 – 10 mm/HR Female: 0 – 20 mm/HR	8 Hrs.	Specimen must be tested within 4 - 6 hours of collection or within 24 hours if blood is stored at 2 - 8°C.
Fetal Hemoglobin (HbF) or Kleihauer-Betke Acid elution	Whole blood - EDTA Lavender top tube Refrigerated Ship on ice (Do not Freeze).	Negative	24 Hrs.	Only a few red cells (<5%) in adult whole blood contain HbF
Fibrinogen Photo-Optical	Plasma Light blue top tube (3.2% Sodium Citrate) If shipped, plasma must be separated within 15 minutes of collection and frozen.	170 – 450 mg/dL	8 Hrs.	
G6PD, Qualitative **Colorimetric**	Whole Blood – EDTA Lavender top tube Specimen must be < 5 days old.	Normal	1 week	Diagnostic test only. NOT for routine deployment test or physicals.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Hematocrit, manual Spun Hematocrit	Whole Blood – EDTA Lavender top tube Refrigerated Ship on ice (Do not freeze).	See Hematocrit values for reference ranges.	8 Hrs.	
Hemoglobin S Screen Sickledex	2 mL whole blood in EDTA Refrigerated	Negative	14 Days	Synonyms: Sickledex, HB S Screen, Sicklequick Frozen or grossly hemolyzed specimens may be rejected. Test may be negative if Hemoglobin S is < 10% or Hemoglobin F is > 25 %. Test may not be valid on newborns and infants up to 12 months of age. A negative screen on a patient < 12 months of age does not exclude the presence of Hemoglobin S. LSL-If Sickle Test is positive, Landstuhl will perform hemoglobin electrophoresis upon request by provider. Sickle cell samples are kept for 7 days.
INR Photo-Optically - calculated	Plasma Light blue top tube (3.2 % Sodium Citrate) If shipped, plasma must be separated within 15 minutes of collection and frozen.	0.7 – 1.2	8 Hrs.	The recommended therapeutic range is an INR of 2.0-3.0. The two exceptions are patients with mechanical heart valves and patients with recurrent thromboembolic events. In these two clinical conditions, an INR of 2.5 to 3.5 is recommended.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Mixing Study (1:1 mix) Photo-Optical	Plasma Light blue top tube (3.2% Sodium Citrate) If shipped, plasma must be separated within 15 minutes of collection and frozen.	See PT and APTT reference ranges.	8 Hrs.	*Pathologist Approval required before ordering *Pathologist Review Required ** Two 5 mL blue top tubes are required.
Partial Thromboplastin Time (PTT or APTT) Photo-Optical	Plasma Light blue top tube (3.2% Sodium Citrate) If shipped, plasma must be separated within 15 minutes of collection and frozen.	24.0 – 35.0 seconds	8 Hrs.	
Post Vasectomy (Sterility Check) Wet Mount Hemocytometer	Seminal Fluid Sterile container If shipped, specimen should be in a sterile container on ice (Do not freeze).	No Sperm Seen.	8 Hrs.	Test should be performed approximately six weeks following surgery
Protime (PT) Photo-Optical	Plasma Light blue top tube (3.2% Sodium Citrate) If shipped, plasma must be separated within 15 minutes of collection and frozen.	10.0 – 13.0 seconds	8 Hrs.	Tube must be full or results may be invalid.
Reticulocyte Count Flow Cytometry	Whole blood-EDTA Lavender tube Refrigerated Ship on ice (Do not freeze).	Newborn: 1.8 – 4.6 % Adult: 0.5 – 1.5 %	8 Hrs.	Specimen must be tested within 8 hours of collection.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Semen Analysis Visual observation, hemocytometer, pH paper and Wright Giemsa Hematoxylin-Eosin stain for morphology.	Seminal Fluid **By Appointment only**. Contact Hematology Section/Front Desk for appt. (486-7511/7500). Specimen must be tested within 30 minutes of collection. Specimens shipped will not be accepted.	Sperm count: 20 – 160 million/mL Color, Semen: Gray-white pH: 7.5 – 8.0 Turbidity: Normal Liquefication: Liquefies within 30 minutes Viscosity: Pours in droplets after liquefication Volume: 2.0 – 5.0 mL Motility: 60% motile Morphology: >60% well formed sperm is considered Normal (see comment in regards to slides)	8 Hrs.	Morphology slides are stained and read on same day as collection. Supervisor will review Thursdays; Pathologist reviews slides if morphology is < 70% normal.
Semen Fructose, Qualitative Seliwanoff Test for Fructose Color Reduction	Seminal Fluid See Above comments	Positive for Fructose	24 Hrs.	Not performed on Post-Vasectomy samples.

11. **MICROBIOLOGY**

a. General Information.

(1) Safety.

(a) Follow standard precautions guidelines. Treating all specimens as potentially hazardous eliminates the need for warning labels.

(b) Use appropriate barrier protection (such as gloves and laboratory coat and gown) when collecting or handling specimens. If splashing may occur, protective eyewear, face masks, and aprons may be necessary.

(c) Do not contaminate the external surface of the collection container and/or its accompanying paperwork.

(d) Minimize direct handling of specimen containers in transit from the patient to the laboratory. Use plastic sealable bags with a separate pouch for paperwork.

(2) General guidelines for proper specimen collection.

(a) Collect specimens before administering antimicrobial agents when possible.

(b) Collect specimens with as little contamination from indigenous microbiota as possible to ensure that the sample will be representative of the infected site.

(c) Utilize appropriate collection devices. Use sterile equipment and aseptic technique to collect specimens to prevent introduction of microorganisms during invasive procedures.

(d) Clearly label the specimen container with the patient's name, identification number, and date/time of collection.

(e) Collect an adequate amount of specimen. Inadequate amounts of specimen may yield false-negative results.

(f) Identify the specimen source and/or specific site correctly so that proper culture media will be selected during processing in the laboratory.

(g) If a specimen is to be collected through intact skin, cleanse the skin first. For example, use 70% alcohol followed by iodine solution (1 to 2% tincture of iodine or 10% of povidone-iodine). Allow iodine to dry completely before collecting samples. Remove excess tincture of iodine with 70% alcohol after specimen has been collected to prevent a skin burn. Alternatively, use chlorhexidine gluconate (2% in 70% alcohol) to cleanse the skin site.

(h) Collect specimens in sturdy, sterile, screw-cap, leak proof containers with lids that do not create an aerosol when opened.

(i) Before collecting the specimen, consider the risk/benefit ratio of the collection procedure to the patient.

(3) General guidelines for proper specimen transport.

(a) Transport all specimens to the laboratory promptly.

[1] To ensure the survival and isolation of fastidious organisms and to prevent overgrowth by more hardy bacteria.

[2] To shorten the duration of specimen contact with some local anesthetics used in collection procedures that may have antibacterial activity.

[3] To provide a more accurate diagnosis of the infectious-disease process.

(b) Alternatives to prompt delivery:

[1] Refrigerate most specimens at 2 to 8° C. The following are exceptions:

[a] If blood is cultured in broth, incubate at 35-37° C.

[b] Specimens that may harbor temperature-sensitive organisms such as *Neisseria* species, *Haemophilus* species, or dermatophytes should be left at room temperature.

[2] For anaerobic specimens, use an anaerobic transport system.

[3] Stool specimens:

[a] For bacterial culture, mix stool with a transport medium (Cary Blair).

[b] For parasitology examination, mix stool with preservative (Para-Pak kit containing formalin and PVA).

[4] CSF specimens - Keep at room temperature. A portion of the sample may be refrigerated if viral culture/amplification is desired.

(c) Use of specimen transport systems.

[1] Anaerobic transport systems are used to ensure the viability of anaerobic organisms in transit to the laboratory. Surface swabs are not appropriate for anaerobic culture.

[2] Although sterile swabs can be used for collection and transport of specimens, the specific specimen requirements for the test requested should be considered prior to specimen collection.

[3] Swab specimens are the least desirable for most cultures. When available, tissue, aspirates, fluids, and scrapings yield superior culture results.

b. Collection Instructions for Different Anatomic Sites.

(1) Blood cultures:

(a) General considerations.

[1] Number and timing: Most cases of bacteremia are detected by using 2 – 3 sets of separately collected blood cultures over a 24-hour period. Typically, this is accomplished by performing venipuncture either at different sites or at different times. **A single blood culture consists of blood from a single venipuncture inoculated into two separate bottles (1 aerobic and 1 anaerobic bottle).** Adequate volume is the single most important factor in the laboratory detection of microorganisms in the blood stream; the more blood cultured, the more likely a culture will be positive. More than three sets of blood cultures yield little additional information. Conversely, a single blood culture may miss intermittently occurring bacteremia and make it difficult to interpret the clinical significance of certain isolated organisms.

[2] Acute sepsis: Collect **minimum of two/maximum of three** blood culture sets from separately prepared sites prior to starting therapy.

[3] Bottle information: Be careful not to cover the barcode or sensor on the bottom of the bottle with the patient label. Check the sensor on the bottom of each bottle. The sensors should be dark green in color. If the sensor is yellow-green to egg yolk yellow do not use that bottle for culture. The vacuum inside the BacT/Alert blood culture bottles will draw more than 10 mL of inoculum. Please regulate how much specimen is injected. Over-filling the bottles may result in erroneous results and must be avoided.

(b) Endocarditis.

[1] Acute: Obtain three blood culture sets from separate sites over a 1 to 2 hour period, and begin therapy.

[2] Subacute: Obtain three blood culture sets on day 1 (15 min or more apart). If all are negative 24 hours later, obtain three additional cultures.

(c) Fever of unknown origin: Obtain two separate blood culture sets. If these are negative, obtain two additional blood culture sets 24 to 36 hours later. The yield of information beyond four cultures is usually minimal.

(d) Volume of blood: The volume of blood is critical because the concentration of organisms in most cases of bacteremia is low, especially if the patient is on antimicrobial therapy. In infants and children, the concentration of organisms during bacteremia is higher than in adults, so less blood is required for culture.

(e) Blood Collection.

[1] Check to make sure the blood culture bottle's expiration date has not been exceeded.

[2] Label bottles with a computer-generated label.

[a] DO NOT cover the barcode on the manufacturer's label or the sensor on the bottom of the bottle.

[b] Be sure label contains collection site and time of collection.

[c] Remove plastic protective cap from each bottle. Cleanse exposed rubber stopper using 70% alcohol; let dry.

[3] Preparation of venipuncture site.

NOTE: Due to chlorhexidine toxicity concerns for patients <2 months of age, prepare skin using 70% isopropyl alcohol prep pads. Allow skin to dry completely. Do not palpate the vein after this preparation of the venipuncture site is completed.

[a] Apply chlorhexidine (2% chlorhexidine gluconate/70% isopropanol) to the access site in concentric fashion, starting from the center and moving to the periphery.

[b] VERY IMPORTANT! Allow chlorhexidine to dry completely – approximately 1 minute. Do not palpate the vein at this point.

[4] Volume of blood for collection.

[a] Adults and adolescents: 10 - 20 mL per venipuncture.

[b] Pre-adolescents: 1 - 4 mL per venipuncture - inoculate entire sample into 1 Pediatric aerobic blood culture bottle (PF).

[5] Collection and transport.

NOTE: It is VERY IMPORTANT that each blood culture set is collected from a separate venipuncture site.

[a] Needle and syringe.

{1} Withdraw 10 - 20 mL of blood for an adult/adolescent blood culture bottle set; 1 – 4 mL of blood for a pediatric blood culture bottle set.

{2} Inject ½ of collected blood into each of two bottles (one adult/adolescent set); **for pediatric/pre-adolescent patients, inoculate the entire 1 – 4 mL sample into 1 Pediatric aerobic blood culture bottle (PF)**.

{a} Do not change the needle before inoculating bottles.

{b} Do not invert bottle when injecting specimen.

[b] Double-needle transfer set.

{1} Crimp collection tubing with a hemostat.

{2} Perform venipuncture.

{3} Secure tubing with a strip of tape near the puncture site.

{4} Insert the opposite end needle through the bottle stopper and release hemostat.

{5} Dispense blood (1/2 of total per venipuncture) into the first bottle using the graduated scale on the bottle label as a guide); **for pediatric/pre-adolescent patients, inoculate the entire 1 – 4 mL sample into 1 Pediatric aerobic blood culture bottle (PF)**.

{6} Re-clamp collection tubing, transfer needle to the second bottle, and repeat steps {4} and {5}.

[c] Transport bottles to the laboratory immediately; do not refrigerate.

(2) Central Nervous System (CNS) Specimens:

(a) Suggested volume is 10 mL for routine, fungal, and mycobacterial cultures.

(b) CSF.

[1] Lumbar Puncture.

[a] Collect according to institution protocol.

[b] Skin puncture site decontamination is critical, both to prevent introduction of organisms into the CNS and to prevent contamination of the CSF with skin flora.

[2] Ommaya Reservoir Fluid.

[a] Clean the Ommaya reservoir site with antiseptic solution and alcohol prior to removal of Ommayal fluid to prevent introduction of infection.

[b] Remove Ommaya fluid via the Ommaya reservoir unit, and place it in a sterile tube.

(c) Other CNS Specimens.

[1] Brain abscess - Ninety percent of brain abscesses will grow anaerobic bacteria. Aspirate material from a lesion and send it to the laboratory in an anaerobic transport system.

[2] CNS biopsy samples - Obtain a biopsy sample from the lesion at surgery, and send it to the microbiology laboratory in a sterile container. The addition of a small quantity of sterile, non-bacteriostatic saline is permissible. DO NOT add formalin.

(3) Gastrointestinal Tract:

(a) The gastrointestinal tract includes the esophagus, stomach, duodenum, small intestine, and colon.

(b) Fecal Specimens.

[1] General Considerations.

[a] Keep stool specimens at room temperature; do not incubate them.

[b] If a stool specimen cannot be plated within one hour of collection, it should be mixed with transport medium (Cary-Blair).

[c] Do not use toilet paper to collect stool. Toilet paper may be impregnated with barium salts, which are inhibitory for some fecal pathogens.

[2] Have the patient obtain a stool specimen by one of the following methods.

[a] Pass stool directly into a sterile, wide mouth, leak proof container with a tight fitting lid. Transfer material to transport medium.

[b] Spread newspaper between lid and bowl. Pass stool onto the newspaper. Transfer material to transport medium.

[c] Rectal Swabs - Pass the tip of a sterile swab approximately one inch beyond the anal sphincter. Carefully rotate the swab to sample the anal crypts, and withdraw the swab. Send the swab to the laboratory in a swab transport system.

(c) Gastric Aspirates.

[1] Gastric Lavage - Submitted primarily for the detection of *Mycobacterium tuberculosis* in patients unable to produce quality sputum. Should be performed after the patient wakes in the morning so that sputum swallowed during sleep is still in the stomach. Must reach lab rapidly to neutralize pH.

[2] Duodenal Aspiration - To aspirate a sample for parasite exam, the tube should be at least in the third portion of the duodenum.

(d) Gastric Biopsies and Washings - Esophageal, stomach, or duodenum specimens. Obtain specimens through a channel in the endoscope by using one of the following procedures:

[1] Using biopsy forceps, obtain samples from the esophagus, stomach, or duodenum.

[2] Use a sheathed brush. Brush suspicious areas several times to obtain adequate cellular material .

[3] Perform a wash by injecting approximately 25 to 30 mL of sterile non-bacteriostatic isotonic saline through the biopsy channel onto the lesion. Collect the specimen by aspirating the fluid through the scope into a sterile trap, which is connected to the suction tubing.

(e) Small Bowel Biopsy - Biopsies of the small intestine provide the highest diagnostic yield for *Microsporidium* species. Biopsies from other gastrointestinal sites have a much lower yield in comparison.

(f) Sigmoidoscopy.

[1] Aspirate liquid from inflamed bowel with a pipette passed through the sigmoidoscope.

[2] Transport specimens in a sterile screw cap container. If biopsy specimens are small, add a small amount of sterile non-bacteriostatic saline to prevent the specimen from drying.

(4) Genital Tract Specimens:

(a) Female.

[1] Amniotic Fluid - Aspirate fluid by catheter, at Cesarean section, or during amniocentesis.

[2] Bartholin Gland – submit duct aspirate in an anaerobic collection device.

[3] Cervix – Use a speculum to avoid vaginal secretions.

[a] Do not use lubricant during procedure.

[b] Wipe the cervix clean of vaginal secretions and mucus.

[c] Rotate a sterile swab, and obtain exudate from the endocervical glands.

[d] If no exudate is seen, insert a sterile swab into the endocervical canal - allow it to remain in place a few seconds, and rotate the swab.

[4] Endometrium - Collect endometrium specimens by transcervical aspiration through a telescoping catheter.

[5] Fallopian Tubes - Obtain aspirates or swab specimens during surgery. Bronchoscopy cytology brushes may be used if exudate is not expressed.

[6] Rectal Swabs - Pass the tip of a sterile swab approximately one inch beyond the anal sphincter. Carefully rotate the swab to sample the anal crypts, and withdraw it. Send the swabs to the laboratory in a swab transport system.

[7] Urethra.

[a] Collect specimens one hour or more after patient has urinated.

[b] Collect the discharge with a sterile swab.

[c] If discharge cannot be obtained, wash external urethra with betadine soap and rinse with water. Insert a urogenital swab 2 to 4 cm into the endourethra, gently rotate the swab, and leave it in place for one to two seconds. Withdraw the swab, and submit it in the appropriate transport system for culture or amplification.

[8] Vagina - Use a speculum without lubricant. Collect secretions from the mucosa high in the vaginal canal with sterile pipette or swab.

(b) Male.

[1] Anal Swab - Pass the tip of a sterile swab approximately one inch beyond the anal sphincter. Carefully rotate the swab to sample the anal crypts, and withdraw it. Send the swab to the laboratory in a swab transport system.

[2] Epididymis - Use a needle and syringe to aspirate material from the epididymis.

[3] Prostatic Massage.

[a] Perform a digital massage through the rectum.

[b] Collect the specimen in a sterile tube or on a sterile swab.

[4] Urethra.

[a] Collect specimens at least one hour after the patient has urinated.

[b] Insert a thin urethrogenital swab 2 to 4 cm into the endourethra, gently rotate it, leave it in place for one to two seconds, and withdraw it.

(5) Ocular Specimens:

(a) General Considerations.

[1] Obtain viral samples before topical anesthetics are applied.

[2] Obtain samples for viral cultures with synthetic fiber swabs with non-wood shafts. Place specimens for viral culture in viral transport medium.

[3] Send inoculated media to the laboratory immediately.

(b) Conjunctival scrapings.

[1] Scrape the lower tarsal conjunctiva with a sterilized Kimura spatula.

[2] Inoculate the appropriate media directly.

[3] Prepare smears by applying the scraping in a circular manner to clean glass slides.

[4] Alternatively, use a synthetic fiber swab to sample the inferior tarsal conjunctiva (inside surface of eyelid) and the fornix of the eye. However, organisms are more readily detected in scrapings than from a swab.

(c) Corneal scrapings.

[1] Obtain conjunctival samples prior to corneal scrapings. Sometimes conjunctival cultures are helpful in assessing the possibility of contamination of corneal cultures.

[2] Using short, firm strokes in one direction, scrape multiple areas of ulceration and suppuration with a sterilized Kimura spatula. (Keep the eyelid open, and be careful not to touch the eyelashes).

[3] Inoculate each scraping directly to appropriate media. (Multiple scrapings are recommended because the depth and extent of viable organisms may vary.)

(d) Intraocular fluid.

[1] Use a needle aspiration technique to collect intraocular fluid.

[2] Inoculate appropriate media directly, and/or immediately transport the samples to the laboratory in an anaerobic transport system or a capped syringe with air bubbles expelled.

[3] Prepare smears by spreading a drop of material over the surface of a cleaned glass slide with a sterile Kimura spatula.

(6) Respiratory specimens:

(a) General considerations.

[1] Twenty-four hour sputum collections will not be cultured.

[2] If *Corynebacterium diphtheriae*, *Arcanobacterium haemolyticum*, *Bordetella pertussis*, *N. gonorrhoeae*, *Legionellae*, *Chlamydiae*, or *Mycoplasmas* are suspected, the physician should contact one of the staff of the clinical microbiology laboratory prior to specimen collection because special techniques and/or media are required for the isolation of these agents.

[3] Expectorated sputa are examined for specimen quality prior to culture.

[4] Anaerobic cultures will only be routinely performed for lung biopsies, lung aspirates and pleural fluid.

(b) Lower respiratory tract.

[1] Expectorated sputum.

[a] If possible, have the patient rinse mouth and gargle with water prior to specimen collection. Remove dentures.

[b] Instruct the patient not to expectorate saliva or postnasal discharge into the container.

[c] Collect specimen resulting from deep cough in sterile screw-cap cup or other suitable sterile collection assembly.

[2] Induced sputum.

[a] Using a wet toothbrush, brush the buccal mucosa, tongue, and gums prior to the procedure. Rinse the patient's mouth thoroughly with water.

[b] Induce sputum production using saline and an ultrasonic nebulizer according to institution protocol.

[c] Collect the induced sputum in a sterile screw-cap cup or other suitable sterile collection assembly.

[3] Tracheostomy and endotracheal aspirations - Aspirate the specimen into a sterile sputum trap.

[4] Bronchoscopy specimens.

[a] Bronchial brush specimens

[b] Transbronchial biopsies

[5] Lung aspirations.

[6] Open Lung biopsies - Obtain a 1 to 3 cm square piece of tissue if possible. If the lesion is large or if there are multiple lesions, collect multiple specimens from representative sites. Submit in a sterile container(s) without formalin. A small amount of sterile, nonbacteriostatic saline may be added to prevent the specimen from drying.

(c) Upper respiratory tract.

[1] Throat (pharyngeal specimens).

[a] Do not obtain throat samples if epiglottis is inflamed, as sampling may cause serious respiratory obstruction.

[b] Depress tongue gently with tongue depressor.

[c] Extend sterile swab between the tonsillar pillars and behind the uvula. Avoid touching the cheeks, tongue, uvula, or lips.

[d] Sweep the swab back and forth across the posterior pharynx, tonsillar areas, and any inflamed or ulcerated areas to obtain sample.

[2] Nasal swabs.

[a] Insert a sterile swab into the nose until resistance is met at the level of the turbinates (approximately 1 inch into the nose).

[b] Rotate the swab against the nasal mucosa.

[c] Repeat the process on the other side.

[3] Nasopharyngeal suctionings - Suction material from the nasopharynx, and collect it in a sterile container.

[4] Nasopharyngeal swabs – use special nasopharyngeal swab on a thin wire.

[a] Remove excess secretions or exudates from the anterior nares.

[b] Carefully insert a flexible-wire calcium alginate-tipped swab through the nose into the posterior nasopharynx. A nasal speculum may be helpful.

[c] Rotate the swab on the nasopharyngeal membrane and keep in place for 10-15 seconds.

[d] Remove swab and place in transport medium.

[e] Alternate method – bend the wire at an angle. Insert the bent wire into the mouth and move the swab upwards into the nasopharyngeal space.

[5] Nasal washings – see Virology Section of this document.

[6] Sinus aspirates - Place the contents of the syringe into an anaerobic transport system, or send in a capped syringe IMMEDIATELY.

[7] Tympanocentesis fluid.

[a] Clean the external canal with mild detergent.

[b] Using a syringe aspiration technique, obtain the fluid from the ear drum. Send aspirates in a sterile container, or send in a capped syringe.

[c] If the ear drum is ruptured, collect exudate by inserting a sterile swab through an auditory speculum.

[8] Oral cavity.

[a] Rinse mouth with sterile saline.

[b] Wipe the lesion with dry sterile gauze.

[c] Swab or scrape areas of exudation or ulceration.

(7) Normally-sterile body fluids (excluding CSF, urine, and blood):

(a) Disinfect the needle puncture site with alcohol and iodine or chlorhexidine as for blood collection. If tincture of iodine is used, remove with 70% ethanol after the procedure to avoid burn.

(b) Expel any air bubbles from the syringe, and immediately inject the specimen into a sterile screw-cap container.

(8) Skin and related site specimens:

(a) Burn specimens.

[1] Gently debride burn to remove eschar.

[2] Sample viable tissue only; biopsy or debridement is superior to swab specimens.

(b) Superficial wounds, bacterial.

[1] Swab samples are inferior to aspirates, scrapings, curettage, or tissue.

[a] If swabs are used for collection, submit two (one for Gram's stain, one for culture).

[b] Prepare site by gentle debridement using sponges moistened with sterile water or sterile non-bacteriostatic saline.

[c] Vigorously sample advancing margin of lesion. Specify anatomic site sampled.

[d] Swabs from superficial lesions will not be cultured anaerobically.

[2] Syringe aspiration is preferable to swab collection.

[3] Disinfect the surface of the wound with either 70% alcohol followed by iodine or chlorhexidine (2% in 70% alcohol). Allow the disinfectant to dry prior to collecting the specimen.

[4] Using a needle and syringe, aspirate the deepest portion of the lesion. If a vesicle is present, collect both fluid and cells from the base of the lesion.

[5] If the initial aspiration fails to obtain material, inject sterile, non-bacteriostatic 0.85% saline subcutaneously and repeat the aspiration attempt.

(c) Superficial lesions, fungal.

[1] Clean the surface with 70% alcohol.

[a] Skin - using a scalpel blade, scrape the periphery of the lesion border.

[b] Scalp lesions - include hair that is selectively collected for examination.

[c] Hair - collect multiple infected hairs with the base of shaft intact.

[d] Nails - clip away a generous portion of the affected area and scrape material under nail.

[2] Transport in a sterile container or sterile petri dish at room temperature.

(d) Ulcers and nodules.

[1] Clean the area with 70% alcohol and then with an iodine or chlorhexidine solution. If tincture of iodine is used, remove with 70% ethanol after the procedure to avoid burn.

[2] Remove overlying debris.

[3] Curette the base of the ulcer or nodule.

[4] If any exudate is present from the ulcer or nodule, collect it with a syringe (preferable) or sterile swab.

(9) Deep wounds, aspirates, and tissue specimens:

(a) Bite wounds - aspirate pus from the wound, or obtain it at the time of wound incision, drainage, or debridement. (Do not culture fresh bite wounds, as infectious agents will likely not be recovered).

(b) Bone.

[1] Obtain bone specimen at surgery.

[2] Submit in sterile container without formalin. Specimen may be kept moist with sterile, non-bacteriostatic saline.

(c) Deep wound or abscesses.

[1] Disinfect the surface with a chlorhexidine solution (preferred) or with 70% alcohol/iodine. If tincture of iodine is used, remove with 70% ethanol after the procedure to avoid burn.

[2] Aspirate the deepest portion of the lesion, avoiding contamination by touching the wound surface. If collection is done at surgery, a portion of the abscess wall should also be sent for culture.

[3] Place sample in a sterile cup and deliver to the laboratory immediately. Use an anaerobic collection system for a portion of the material when delivery will be delayed.

(d) Punch skin biopsies.

[1] Disinfect the skin surface with a chlorhexidine solution (preferred) or with 70% alcohol/iodine. If tincture of iodine is used, remove with 70% ethanol after the procedure to avoid burn.

[2] Collect a 3 to 4 mm sample with dermal punch.

[3] Submit biopsy in a sterile container containing a small amount of sterile, non-bacteriostatic saline. Do not use formalin.

(10) Urine:

(a) General considerations.

[1] Never collect urine from a bedpan, urinal, or collection bag.

[2] Thoroughly clean the urethral opening (and vaginal vestibule in females) prior to collection procedures to ensure that the specimen obtained is not contaminated with colonizing microorganisms in this area.

[3] Soap rather than disinfectants is recommended for cleaning the urethral area. If disinfectants are introduced into the urine during collection, they may be inhibitory to the growth of microorganisms.

[4] Transport specimen to laboratory within 1 hour of collection. If it cannot be transported within 1 hour of collection, the urine specimen should be refrigerated. (Bacterial counts remain stable for at least 24 hours at 4° C.) DO NOT FREEZE.

[5] Use sterile cups or tubes to transport urine. Also, urine transport kits containing a preservative are available.

[6] Transport suprapubic bladder aspirate (SPA) specimens for anaerobic culture in an anaerobic transport system.

[7] Always transport urine for viral cultures on wet ice in a sterile container.

[8] Send the first morning voided urine. Three consecutive first morning urine specimens are recommended for mycobacterial culture.

[9] Do not submit 24-hour urine collections for culture.

(b) Collection techniques.

[1] Clean-catch urine specimens – female.

[a] The person obtaining the urine specimen should wash his/her hands with soap and water, rinse, and dry. If the patient is collecting the specimen, she should be given detailed instructions, including diagrams or a pictorial display.

[b] Cleanse the urethral opening and vaginal vestibule area with soapy water or clean gauze pads soaked with liquid soap.

[c] Rinse the area well with water or wet gauze wipes.

[d] Hold labia apart during voiding.

[e] Allow a few milliliters of urine to pass. (Do not stop the flow of urine.)

[f] Collect the midstream portion of urine in a sterile container.

[2] Clean-catch urine specimens – male.

[a] The person obtaining the urine should wash his/her hands with soap and water, rinse, and dry. If the patient is collecting the specimen, he should be given detailed instructions, including diagrams or a pictorial display.

[b] Cleanse the penis, retract the foreskin (if not circumcised), and wash with soapy water.

[c] Rinse the area well with water.

[d] Keeping foreskin retracted, allow a few milliliters of urine to pass. Do not stop the flow of urine.

[e] Collect the midstream portion of urine in a sterile container.

[3] Ileal conduit urine.

[a] Remove the external urinary appliance, and discard the urine within the appliance.

[b] Gently swab and clean the stomal opening with a 70% alcohol pad and then with an iodine solution or chlorhexidine.

[c] Using sterile technique, insert a double catheter into the stoma. A double catheter helps to minimize contamination of the specimen with skin flora.

[d] Catheterize the ileal conduit to a depth beyond the fascial level.

[e] Collect the urine drained into a sterile container.

[4] Straight catheter urine (Robinson catheter; in/out catheter).

[a] Collect the initial 15 to 30 mL of urine, and discard it from the mouth of the catheter.

[b] Collect a sample from the mid or later flow of urine in a sterile container.

[5] Indwelling catheter urine (Foley catheter).

[a] Clean the catheter collection port with a 70% alcohol wipe.

[b] Using sterile technique, puncture the collection port with a needle and syringe. Note: Do not collect urine from collection bag.

[c] Aspirate the urine, and place it in a sterile container.

[d] Foley catheter tips will not be cultured.

[6] Bladder washout.

[a] Following catheterization, collect an initial urine specimen into a sterile container, and refrigerate it.

[b] Empty the bladder through the urethral catheter, and then irrigate with sterile, non-bacteriostatic saline.

[c] Collect three additional specimens (5 to 10 mL each) at 10 minute intervals into separately labeled containers after irrigation of the bladder is performed.

[d] Submit the initial and timed collection samples to the clinical microbiology laboratory for culture. Note: It is imperative that each specimen container be clearly labeled with the time of specimen collection.

[7] Cystoscopy: bilateral urethral catheterization - using sterile technique, collect approximately 5 to 10 mL of urine from open stopcock into a sterile container.

MICROBIOLOGY TEST LIST

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
***Acinetobacter* Screen** Culture for and identification of *Acinetobacter* species ONLY. Includes antimicrobial susceptibility testing of *Acinetobacter* isolates.	Swab of skin in transport medium. Suggested skin sites include axilla and groin.	No *Acinetobacter* isolated.	1 – 2 days	***Synonyms***: AS, AS Screen, Acineto
Bacteria Agglutination Antigen Latex agglutination for the direct qualitative detection of antigens to *H. influenza* type B, *S. pneumoniae*, Group B *Streptococcus, N. meningitidis* groups A, B, C, Y, or W135 and *E. coli* K1 in CSF or urine.	CSF: 1-1.5 mL in sterile container. Room temperature. If delivery is delayed, refrigerate or freeze up to 48 hrs. Urine: 15 to 20 mL in sterile container. Room temperature.	No bacterial antigens detected	1 day	Specimens of insufficient quantity will be rejected. Urine testing is not offered STAT due to the requirement to concentrate the sample. ***Synonyms***: Meningitis Panel, Antigen Detection, Latex Agglutination Panel, Bactigen, Directigen, Bacterial Antigen Detection, CSF Latex, Wellcogen.
Blood Parasites Microscopic detection of blood parasites in thick and thin blood smears. Includes speciation if parasites are detected.	Blood collected in EDTA (purple top). Specify suspected parasite(s). Room temperature. Refrigerate if submission is delayed. Provide travel/deployment history in order comments.	No blood parasites detected. Infection with a blood parasite cannot be ruled out by a single blood sample. If clinical suspicion for malaria remains high, collect additional samples every 6-12 hours for up to 3 days.	1 – 2 days	Specimens must be collected in EDTA or specimen will be rejected. If there will be delays in shipping, please provide UNFIXED thick and thin smears along with blood specimen. ***Synonyms***: Malarial Smear, Malarial Examination.

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Cryptococcal Antigen Direct detection of *Cryptococcus neoformans* capsular antigen by latex agglutination.	Serum: red top tube. CSF: sterile tube. Room temperature. Refrigerate if submission is delayed.	Negative for cryptococcal antigen.	1 day	Titers performed only upon request**.** ***Synonyms***: *Cryptococcus neoformans*
***Cryptosporidium/Giardia* Direct Immunofluorescent Detection Screen** Direct detection of *Giardia* and *Cryptosporidium* from feces by immunofluorescent antibody method.	Stool specimen preserved in 10% formalin. ParaPak or other commercial 2-vial collection kit. Room temperature.	Negative for *Cryptosporidium* & *Giardia*	3 days	This screening assay is the primary test performed on stool submitted for parasitology examination. Order full O&P exam for patients with travel history, known contact, or immunosuppression. ***Synonyms***: Screen; *Giardia; Cryptosporidium;* Panel, Parasite; O&P panel; Parasite ID.

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, Aerobic Culture for and identification of aerobic bacteria and yeasts. **Includes Gram's stain.** Includes antimicrobial susceptibility testing for significant aerobic bacterial isolates for which standard methods have been established.	Exudate/Tissue/Biopsy/Other Miscellaneous: native specimen preferred. If necessary, collect with a culturette swab in transport medium. Bone Marrow: heparin (green top) tube. Aspirates, fluids, and tissue provide best yield and most meaningful results. Specimens that can be aspirated with a needle and syringe should be submitted in a capped syringe without needle or injected into a sterile container. Place tissue or scrapings into a sterile container. When swabs must be used, collect 2 swabs. One swab for culture and the other for Gram stain. Avoid contamination with body surfaces. **Specify collection site**. Room temperature.	No organisms isolated from sterile sites.	3 – 5 days	Specimens must NOT be frozen, on ice, or refrigerated. The specimens must be accompanied with the culture source information. ***Synonyms***: Aerobic; Wound Culture, Culture, Wound; Abscess Culture; Ear Culture; Eye Culture; Aerobic Culture; Bone Marrow Culture; Biopsy Culture; Dental Culture

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, Anaerobic Culture for and identification of anaerobic bacteria. **Includes Gram's stain.** Sample types unacceptable for anaerobic culture: Throat, nose, oral swabs; sputum or bronchial washings; non-surgical vaginal or cervical swabs; voided urine, feces or related material; skin or superficial wounds.	Aspirates, fluids, and tissue provide best yield and most meaningful results. Specimens that can be aspirated with a needle and syringe should be submitted in a capped syringe without needle or injected into an anaerobic transport device. Place tissue and fluids into a sterile container. Surface swabs are not appropriate for anaerobic culture. When swabs must be used, collect sample with anaerobic device (e.g. Port-A-Cul). Transport all sample types to the laboratory immediately after collection.. **Specify collection site**. Room temperature	No organisms isolated from sterile sites.	5 – 7 days	The specimen must NOT be frozen, on ice, or refrigerated. The specimen must be accompanied by the culture source information. ***Synonyms***: Ana; Anaerobic; Wound Culture; Culture Wound; Abscess; Bone Culture; Sinus Culture; Fluid Culture; Body Fluid Culture; Bone Marrow Culture; Tissue Culture; Biopsy Culture; Dental Culture; IUD Culture; Culture, Fluid; Anaerobic Culture

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, Blood (Adult) Broth culture system providing continuous monitoring for growth of bacteria and yeast (other than *Cryptococcus*) over a 5-day period. Adult blood culture includes one aerobic and one anaerobic bottle (per set). Includes antimicrobial susceptibility testing of significant aerobic bacterial isolates for which standard methods have been established.	Key points **(see complete procedure at beginning of this section):** **1. Rigorous skin decontamination with alcohol/iodine or chlorhexidine prior to phlebotomy is critical.** **2. Allow disinfectant to dry** completely **before venipuncture.** **3. Clean rubber diaphragm of culture bottles with 70% alcohol after removing bottle tab and before injecting blood.** **4. NEVER fill more than 1 set of bottles from each venipuncture site.** **Adults/adolescents: 10-20mL per venipuncture.** **Sepsis:** Always collect at least 2 sets from separate venipuncture sites; third set may be collected within a 24 hour period per episode. **Endocarditis:** For acute, collect 3 sets from separate sites within 1 hour. For SBE, collect 3 sets from separate sites within 24 hours; if negative at 24 hours, collect 3 more sets. **Line draws:** Collect one set through the line and another by venipuncture. Room temperature.	No growth.	5 – 10 days.	**Do not cover bottle barcode with labels.** The specimens must be properly labeled and have sufficient volume. **Positives**: reported to physician or unit by phone as soon as culture becomes positive. **Negatives**: preliminary report after 48 hours incubation. **Final Report**: 5 days NOTE: Longer incubations coordinated through Laboratory Director. ***Synonyms***: Blood culture, Blood C&S, Adult

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, Blood (Pediatric) Broth culture system providing continuous monitoring for growth of bacteria and yeast (other than *Cryptococcus*) over a 5-day period. Pediatric blood culture is comprised of a single aerobic bottle (per set). Includes antimicrobial susceptibility testing of significant aerobic bacterial isolates for which standard methods have been established.	Key points **(see complete procedure at beginning of this section):** **1. Rigorous skin decontamination with alcohol/iodine or chlorhexidine prior to phlebotomy is critical.** **2. Allow disinfectant to dry** completely **before venipuncture.** **3. Clean rubber diaphragm of culture bottles with 70% alcohol after removing bottle tab and before injecting blood.** **4. NEVER fill more than 1 set of bottles from each venipuncture site.** **Adults/adolescents: 10-20mL per venipuncture.** **Sepsis:** Always collect at least 2 sets from separate venipuncture sites; third set may be collected within a 24 hour period per episode. **Endocarditis:** For acute, collect 3 sets from separate sites within 1 hour. For SBE, collect 3 sets from separate sites within 24 hours; if negative at 24 hours, collect 3 more sets. **Line draws:** Collect one set through the line and another by venipuncture. Room temperature.	No growth.	5 – 10 days.	**Do not cover bottle barcode with labels.** The specimens must be properly labeled and have sufficient volume. **Positives**: reported to physician or unit by phone as soon as culture becomes positive. **Negatives**: preliminary report after 48 hours incubation. **Final Report**: 5 days NOTE: Longer incubations coordinated through Laboratory Director. ***Synonyms***: Blood culture, Blood C&S, Pediatric

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Culture, Body Fluid Culture for and identification of aerobic bacteria and yeasts. **Includes Gram's stain**. Includes antimicrobial susceptibility testing of significant aerobic bacterial isolates for which standard methods have been established. **Anaerobic culture must be ordered separately**. See Culture, Anaerobic	Synovial, Amniotic, Pericardial, Peritoneal, Pleural, Culdecentesis, Tympanocentesis: sterile tubes. Room temperature. Refrigerate if submission is delayed. If using a Vacutainer tube, betadine top of tube and allow to dry completely prior to injection of sample. Transport to laboratory immediately after collection. Collection of **large volume** samples into a blood culture bottle is permissible. Submit a portion of the native specimen along with the bottle. **NOTE**: If samples are received in blood culture bottles ONLY, stains will not be prepared and additional media will not be inoculated. This may cause a delay in isolation, identification, and susceptibility testing of organisms, especially in cases of mixed growth. Room temperature.	No growth.	3 – 5 days.	Refer to Culture, CSF for specific instructions concerning CSF specimens. ***Synonyms***: Sterile Fluid Culture; Fluid Culture; Body Fluid; Body Fluid Culture; Culture, Body Fluid.

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, *Bordetella* Culture for and identification of *Bordetella* species.	Nasopharyngeal aspirate optimal; nasopharyngeal swab is an acceptable alternative. **Contact laboratory prior to collection**. Laboratory will provide culture medium for bedside inoculation of nasopharyngeal swab or NP aspirate. The inoculated medium must be delivered to the lab immediately. Room temperature.	No *Bordetella* species isolated.	7 – 10 days.	*Bordetella* species are very difficult to isolate. Consider molecular amplification methods – contact Microbiology for further information.
Culture, CSF Culture for and identification of aerobic bacteria and yeasts. **Includes Gram's stain**. Includes antimicrobial susceptibility testing of significant aerobic bacterial isolates for which standard methods have been established.	Sterile tube(s) from spinal set. 1. When possible, submit 3 tubes: Tube 1 = Chemistry Tube 2 = Microbiology Tube 3 = Hematology 2. Transport to lab immediately. 3. Do not refrigerate unless for viral studies. Consult Microbiology if anaerobic culture required. Room temperature.	No growth.	3 – 5 days	***Synonyms***: CSF Culture; Fluid Culture; Sterile Fluid Cult; Cult, Fluid; Body Fluid Culture.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Culture, Fungal Culture for and identification of yeasts and moulds.	Hair: Collect multiple infected hairs with base of shaft intact. Skin: Thoroughly clean affected area with 70% alcohol and gently scrape skin surface at active margin. Nails: Wipe with 70% alcohol. Clip away generous portion of affected area and scrape material under nail. Sterile container. Body fluid, tissue, other: sterile container. Blood, bone marrow: heparin (green top) tube. Room temperature.	No fungal growth.	4 – 6 weeks.	LRMC Microbiology will culture and identify yeasts in-house. Mold isolates are identified by: Bioscientia Konrado-Adenauer-Strasse 17 55218 Ingelheim 06132-781224 ***Synonyms***: Mycology Culture; Fungus Smear/Culture; Fungal Smear/ Culture; Culture, Fungal; Fungal Culture.
Culture, GC Culture for and identification of *Neisseria gonorrhoeae*. Antimicrobial susceptibility testing available by request only.	Throat, Urethra, Eye, Rectal swab, Cervix, Vagina, Other: swab in transport medium. Samples may also be inoculated at bedside directly onto a culture plate. Swabs must be transported to the laboratory within 30 minutes of collection. Inoculated plates must be delivered to the lab immediately or exposed to an atmosphere of 3-8% CO_2 within 30 minutes of inoculation. Room temperature	No *Neisseria gonorrhoeae* isolated.	3 – 5 days	The plates or culturette swabs must NOT be refrigerated. Media must be placed in bio bags with CO_2 generator. Gonococci are highly susceptible to drying, temperature extremes, and oxidation. ***Synonyms***: GC Culture, *Neisseria gonorrhoeae*.

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, Genital Culture for and identification of potential aerobic genital pathogens including beta hemolytic streptococci, yeast, and *Neisseria gonorrhoeae*. **Includes Gram's stain**. Includes antimicrobial susceptibility testing of significant aerobic bacterial isolates for which standard methods have been established. **Anaerobic culture must be ordered separately**. See Culture, Anaerobic.	Urethra, Cervix, Prostatic Secretion, Vagina: swab in transport medium. Endometrium, Epididymis, Abscess, Genital Ulcer, Bartholin Gland/Duct, Abscess: aspirates, curettage, or tissue provide best yield and most meaningful results. Specimens that can be aspirated with a needle and syringe should be submitted in a capped syringe without needle or injected into a sterile container. Place tissue or scrapings into a sterile container. To the greatest extent possible, avoid contamination with normal genital flora. Consider anaerobic culture. Room Temperature. Refrigerate if submission is delayed.	Growth of normal genital flora only.	3 – 5 days.	***Synonyms***: Genital Culture; Urethral Cult; Cx Cult; Cult, Cervical; Genital Cult; Vaginal Cult; Gardnerella Cult.
Culture, Group B Strep Screening culture utilizing selective enrichment for Group B *Streptococcus.* **Antimicrobial susceptibility testing by request only**.	Vaginal/Rectal: Preferred sample giving highest detection rate. Swab in transport medium. Alternatively, collect separate vaginal and rectal swabs for a single culture order. Deliver promptly or refrigerate.	No Group B *Streptococcus* isolated.	2 –3 days.	Specify penicillin allergy in the order comments field. GBS isolates from these patients will be tested for susceptibility to erythromycin and clindamycin. ***Synonyms***: Group B Strep; Grp B Strep; Strep B

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Culture, *Mycobacterium* Culture for acid-fast organisms. **Includes acid fast smear and *Mycobacterium tuberculosis* DNA probe assay**.	CSF: 5-10 mL in sterile tube. Body fluids: sterile tube. Urine: 50 mL in sterile tube. Sputum: sterile tube or cup. 3 consecutive first AM samples optimize recovery. Tissue: sterile container. Refrigerate. Bone Marrow: heparin (green top) tube. Room temperature.	No growth of acid-fast organisms.	8 – 12 weeks	***Synonyms***: Mycobacterium culture, TB Smear/Culture, TB Culture Send out: Dr Med Michael Klein und Partner Hertelsbrunnenring 2 66757 Kaiserslautern TEL: 0631/3438210 Antimycobacterial susceptibility testing performed on mycobacterial species identified.
Culture, Respiratory Culture for and identification of potential lower respiratory tract pathogens including bacteria and yeast. **Includes Gram's stain**. Includes antimicrobial susceptibility testing of significant aerobic bacterial isolates for which standard methods have been established.	Sputum: sterile container. Samples screened for quality. Only those specimens meeting specific criteria and representative of lower respiratory tract secretions will be cultured. Bronchial wash, BAL, bronchial brushings, aspirates from tracheostomies, lung tissue, lung aspirate: sterile container. BAL, bronchial brushings cultured quantitatively. All other types cultured qualitatively. Bronchial brushings, lung tissue, lung aspirates also cultured anaerobically. Room temperature.	Non-sterile site samples: Growth of normal respiratory tract flora only. Sterile site samples: no growth.	3 – 5 days	Specimens must be representative of lower respiratory secretions. (Specimens suggestive of saliva will be rejected). ***Synonyms***: Bronch Brushing Culture; Sputum, Respiratory; Bronchial Washing Culture; Respiratory Culture

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, Stool Culture for *Salmonella, Shigella, Campylobacter, Aeromonas,* and *Plesiomonas.* **Culture for *Vibrio, Yersinia,* or *E. coli* O:157 must be ordered separately (see below)**. Includes antimicrobial susceptibility testing of isolates for which standard methods have been established.	Stool: Preferred sample. Collect in a clean plastic container. Must be delivered to the laboratory within 2 hours. If submission is delayed beyond 2 hours, use fecal preservative system (Cary-Blair). **Do not use formalin**. Rectal swab: Alternative sample. Swab in transport medium. Room temperature. Do not refrigerate.	No *Salmonella*, *Shigella*, *Campylobacter*, *Aeromonas*, or *Plesiomonas* isolated.	3 – 5 days.	Dry rectal swabs will not be processed. Only one stool sample collected on a single day will be processed. Samples collected from patients >3 days after admission require laboratory consult before sample will be processed. ***Synonyms***: Stool Culture, Fecal Culture, Stl Culture, Campylobacter
Culture, Throat Screening culture for beta-hemolytic *Streptococccus* only.	Swab in transport medium. Room temperature.	No beta-hemolytic *Streptococcus* isolated.	2 – 3 days.	***Synonyms***: Strep Screen, TC, Throat, Culture, Group A Strep, Culture, Grp A Strep, Strep A Screen
Culture, Urine Culture for and identification of aerobic bacteria and yeasts. Includes antimicrobial susceptibility testing of isolates for which standard methods have been established.	Clean-catch urine: sterile container. Catheterized urine: sterile container. **Do not submit urine from the bag**. Suprapubic aspirate: syringe or sterile container. Pediatric bagged urine: cleanse region prior to collection. Room temperature. If >1 hour, refrigerate.	No growth.	2 – 3 days.	Room temperature urine must be received within 1 hour of collection. Urine left at Room temperature may yield highly misleading colony counts. ***Synonyms***: Urine Culture, UC, UR C&S, Urine C&S, UA Culture

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Culture, Vibrio/Yersinia/O157 Culture for *Salmonella, Shigella, Campylobacter, Aeromonas, Plesiomonas, Vibrio, Yersinia,* and *E. coli* O:157. Includes antimicrobial susceptibility testing of isolates for which standard methods have been established.	Stool: Preferred sample. Collect in a clean plastic container. Must be delivered to the laboratory within 2 hours. If submission is delayed beyond 2 hours, use fecal preservative system (Cary-Blair). **Do not use formalin**. Rectal swab: Alternative sample. Swab in transport medium. Room temperature. Do not refrigerate.	No *Salmonella, Shigella, Campylobacter, Aeromonas, Plesiomonas, Vibrio, Yersinia,* or *E. coli* O:157 isolated.	3 – 5 days	Dry rectal swabs will not be processed. Only one stool sample collected on a single day will be processed. Samples collected from patients >3 days after admission require laboratory consult before sample will be processed. ***Synonyms***: Culture, Stool, Stool Culture, Fecal Culture, Feces, STL Culture, Vibrio Culture, Yersinia, E coli O157, Culture, Vibrio

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Fecal Fat, Qualitative Microscopic examination of stool stained with Sudan III.	Feces/Intestinal Aspirates: sterile container. Room temperature. If > 2 hours, freeze. **Do not use preservatives**.	Normal: 1 – 100 fat globules present per low power field. Increased: >100 fat globules present per low power field. Decreased: no fat globules present.	Daily	***Synonyms***: Fat/Qualitative, Stool for Fat, Fecal Fat
Fecal Leukocytes Demonstration of leukocytes in stained fecal smears.	Fresh, unpreserved stool. Collect and submit immediately after voiding. **Do not freeze**. Solid, formed stool will not be evaluated.	No leukocytes present.	Daily	***Synonyms***: Fecal WBC, Stool WBC, Leukocyte, Fecal, WBC, Stool
GC Smear Detection of *Neisseria gonorrhoeae* in gram-stained smears. Additional testing for GC, especially for women, is recommended.	Male urethra: discharge collected on a swab in transport medium. Alternatively, prepare smear of discharge at bed-side. Endocervix: discharge collected on a swab in transport medium. Alternatively, prepare smear of discharge at bed-side. Collect material by direct visualization of the cervix using a speculum. Extreme care must be taken not to contaminate material with vaginal secretions. **Throat swabs are not acceptable**. Room temperature.	No gram-negative intracellular diplococci present.	Daily	Slides must not be broken and must be labeled properly. ***Synonyms***: Smear GC, GC Stain, GC Gram Stain, Urethral Smear

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Gram Stain Detection of bacteria and yeasts in clinical material by microscopic examination of gram-stained preparations. **Gram-stains are included with most cultures**.	Exudates, secretions, fluids, tissue, swab in transport medium. Room temperature if Gram's stain only.	No bacteria or yeast seen in sterile site specimens.	Routine: Daily STAT: 1 hour	Specimens must be properly labeled to include patient name and specimen source. ***Synonyms***: GS, Direct Smear, Gram Smear, GM ST, GM Stain.
KOH Prep Detection of fungal elements (yeasts and hyphae) by microscopic examination of specimens dissolved with potassium hydroxide.	Hair: Collect multiple infected hairs with base of shaft intact. Skin: Thoroughly clean affected area with 70% alcohol and gently scrape skin surface at active margin. Nails: Wipe with 70% alcohol. Clip away generous portion of affected area and scrape material under nail. Sterile container. Body fluid, tissue, other: sterile container. Room temperature.	No fungal elements seen.	Daily	Specimens will be rejected that are submitted on cotton swabs, which may appear as fungal elements. ***Synonyms***: Smear, KOH.
(MRSA) **Methicillin-resistant** ***Staphylococcus aureus* screen** Culture for and identification of methicillin-resistant *Staphylococcus aureus.* Includes antimicrobial susceptibility testing of MRSA isolates.	Nares: swab in transport medium. Axilla, groin, other skin: swab in transport medium. Room temperature.	No methicillin-resistant *Staphylococcus aureus* isolated	2 – 3 days	Sampling both nares improves isolation rate. Specify in order comments field if culture for both methicillin-resistant and methicillin-susceptible *Staphylococcus aureus* is desired. MRSA indicates that the organism will be resistant to all beta-lactam agents. ***Synonyms***:MRSA Surveillance, R/O Meth Resistant S Aureus

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Occult Blood Detection of small quantities of blood that are not visible to the naked eye.	Stool smear on test card of various types. Patient should abstain from meat consumption for 3 days prior to testing. **Follow collection instructions on test card**. Room temperature.	Negative.	Daily	***Synonyms*:** Stool for Blood, Stool Guiac, Hemoccult, Hem Occ, Guiac, Fecal Cult, Blood, Occult
Ova and Parasite Exam Detection of parasites through the microscopic examination of specimen concentrates and trichrome-stained smears.	Urine, sputum, CSF: sterile container. Aspirates: capped syringe or sterile container. Minimum volume of 2 mL for the sample types above. Stool: commercial 2-vial collection kit (e.g. PAR-A-PAK). One vial must contain formalin and the other PVA. **These preservatives are toxic so please use caution and follow directions included with the collection kit**. Collect and preserve stool immediately after passage. Avoid contact with water or urine. Delay collection for at least 1 week from patients who have ingested barium, bismuth, mineral oil, or non-absorbable anti-diarrheal agents **Samples collected from patients >3 days after admission will not be processed**. Room temperature	No ova or parasites found in specimen.	5 – 7 days	Test not routinely performed. HCP should provide clinical indications for complete O&P exam (travel to or residence in endemic regions, known contact, immunosuppression, etc.). **All routine tests will be reordered for *Giardia/Cryptosporidium* Screen Test**. ***Synonyms***: O&P Examination, O&P Panel, OP Exam, OP Panel, Panel Parasite, Parasite ID, Parasite Screen, Ova & Parasite Exam, Requests for more than 3 samples per patient requires prior consultation with, and approval from, one of the following: Chief, Clinical Microbiology; Chief, Microbiology Section; or Medical Director, Clinical Pathology Service.

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Pinworm Prep Direct detection of *E. vermicularis* (Pinworm) eggs by microscopic examination.	Sticky paddle device or scotch tape prep on glass slide. Collect material in first AM, before patient has defecated or bathed. Place suspected adult worms in 70% alcohol or vinegar.	No *Enterobius vemicularis* (Pinworm) ova present.	Daily	***Synonyms***: Pin Worm Examination, PW Exam
Rapid Group A Strep Direct detection of *Streptococcus pyogenes* (group A *Streptococcus*) by enzyme immunoassay.	Throat swab: use only rayon or Dacron-tipped swabs with plastic shafts. Collect 2 swabs - one for the antigen test and the other for culture if the antigen test is negative.	Negative for Group A *Streptococcus* antigen.	Daily	***Synonyms***: Rapid Strep, Strep Pyogenes Ag
Rapid Group B Strep Direct detection of *Streptococcus agalactiae* (group B *Streptococcus*) by optical immunoassay	Swab of lower vagina (vaginal introitus). **Cervical swabs are not recommended**. Room temperature.	Negative for Group B *Streptococcus* by Rapid Optical Immunoassay (OIA).	1 hour	Results obtained with the GBS Rapid OIA should be used as an adjunct to culture. ***Synonyms***: Rapid Strep; Group B Strep; Strep B.

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Rapid HIV Screen Rapid detection of antibody against HIV-1 by membrane immunoassay.	Blood collected in EDTA (purple top). Room temperature. Refrigerate if submission is delayed. **Not for routine HIV screening. Use only for blood pathogen exposure or emergency situations**.	Negative for HIV-1 antibodies.	1 hour	***Synonyms***: Rapid, Needlestick, Rapid HIV Screen, Oraquick Rapid HIV Test
Rapid Influenza Antigen Direct detection of Influenza Virus by membrane enzyme immunoassay.	Nasopharyngeal aspirate or wash, or nasal swab. Throat swabs not recommended. Place 2-3 ml NP aspirate or wash into sterile container. Place swab samples into viral transport medium.	Negative for influenza antigen.	1 hour	Highest detection rate using NP aspirate or wash. All negative antigen test results should be followed up with viral culture or other detection method. ***Synonyms***: Influenza, Rapid Flu
Rapid RSV Antigen Direct detection of Respiratory Syncytial Virus by membrane enzyme immunoassay.	Nasopharyngeal aspirate, wash, or swab in viral transport medium. Throat swabs not recommended. Place 2-3 ml NP aspirate or wash and all swab samples into viral transport medium. Refrigerate. Freeze if submission is delayed >2 days.	Negative for RSV antigen.	Daily	Highest detection rate using NP aspirate or wash. Excessively bloody specimens will not be tested due to a high rate of uninterpretable and false-positive results. ***Synonyms***: RSV latex, RSV Screen, Respiratory Syncitial Virus Ag
Saline Wet Prep Detection of *Trichomonas*, yeast, and clue cells by microscopic examination of specimen diluted with saline.	Vagina/vaginal discharge: swab in transport medium. **Samples must be received within 1 hour of collection**. Room temperature.	No *Trichomonas*, yeast, or clue cells seen.	Daily	***Synonyms***: Saline Prep, Trichomonas, Gardnerella Vaginalis.

Test **Test Method**	**Specimen** **Shipping Requirements**	**Reference Range**	**Turnaround Time**	**Comments**
Vancomycin-resistant *Enterococcus* (VRE) Screen Culture for and identification of vancomycin-resistant *Enterococcus* species ONLY. Includes antimicrobial susceptibility testing of VRE isolates.	Rectal swab in transport medium. Room temperature.	Culture negative for vancomycin-resistant *Enterococcus* (VRE)	2 – 3 days	***Synonyms***: VRE, VRE Surveillance.

12. **IMMUNOLOGY**

a. General Information. The **Immunology** Section is located on the first floor in Building 3738, Room 113, in the Microbiology Section. The Immunology Section is staffed only during normal duty hours, i.e., 0730 – 1630 Monday through Friday, excluding training holidays and holidays.

b. Problems, issues, requests, or complaints should be directed to the Immunology civilian supervisor or NCOIC at DSN 486-6570, or, if unsatisfied with the response obtained, to the OIC at DSN 486-8225.

c. Results will not be given over the phone to patients, only health care providers will be given telephonic results. Patients will be referred to their provider or the ward/clinic where they were seen to obtain their results. Alternatively, patients may contact the Release of Information office in the Patient Administration Division to obtain their results.

d. Tests Performed. The following is a complete list of diagnostic testing performed in the Immunology Section.

(1) Hepatitis Serology.

(a) Acute Hepatitis Panel.

[1] Hepatitis A IgM (HAVM)

[2] Hepatitis B Surface Antigen (HBsAG)

[3] Hepatitis B Core Antigen, Total (IgM and IgG); also known as Anti-HBc

[4] Hepatitis C (HCV)

(b) Hepatitis B Panel.

[1] Anti-Hepatitis B Surface Antigen (Anti-HBsAG)

[2] HBsAG

[3] Anti-HBc

(c) Any of the five Hepatitis tests can be ordered individually.

[1] HBsAG

[2] Anti-HBc

[3] Anti-HBsAG

[4] HAVM

[5] HCV

(d) **DO NOT ORDER the Hepatitis B Surface Antigen Confirmatory test (HBsAG Confirm LAB USE ONLY)** as this test should only be ordered as a reflex test by laboratory personnel to confirm an initial HBsAG screening reactive/positive result.

(2) Immune Serology (Auto-immune and Syphilis Serology).

(a) Anti-Nuclear Antibody (ANA)

(b) Anti-nDNA (Anti-double stranded DNA Antibody)

(c) Rapid Plasma Reagin (RPR)

(d) Venereal Disease Research Laboratory (VDRL); **Note:** This test is only performed on CSF specimens

(e) Treponema pallidum Particle Agglutination (TP-PA); a common synonym in CHCS is the MHA-TP test

(f) Heterophile Antibody Test (Monospot)

(g) Rheumatoid Factor (RF)

(h) Anti-Streptolysin Antibody (ASO)

(i) Microsomal Antibody (MA)

(j) Thyroglobulin Antibody (TA)

e. Schedule of Testing. The following is a listing of the daily/weekly testing schedule in the Immunology Section.

(1) STAT Testing – VDRL diagnostic testing performed on CSF specimens only. Reactive/positive results are considered critical and the provider will be notified of these results telephonically.

(2) Daily Testing.

(a) All Hepatitis testing

(b) Heterophile Antibody testing

(3) RPR's are performed M-W-F.

(4) Bi-weekly testing.

(a) ANA

(b) Anti-DNA

(c) RF/ASO

(d) TP-PA

(5) Weekly testing - MA/TA.

f. Specimens Accepted/Submission Guidelines. Only serum specimens will be accepted for testing in the Immunology Section, with the exception of CSF for VDRL testing. All specimens can be shipped REFRIGERATED (2-8º C), unless the requesting activity is unable to get the specimens to the LRMC DPALS within 7 days of draw - the specimen must then be shipped FROZEN. Grossly

hemolyzed, lipemic, or icteric specimens will not be tested. Tests on such specimens will be resulted as "Test Not Performed" (TNP) and the reason why the diagnostic testing was not done will be entered as a comment to the result. Any specimens with high amounts of particulate matter will also be resulted as "Test Not Performed."

g. Specimen Retention/Additional Test Requests. The Immunology Section normally keeps all specimens for 14 days from date of testing. If a health care provider desires further testing on a patient's specimen, he/she should contact the Immunology Section at DSN 486-6570/7997 and speak to the civilian supervisor or the NCOIC to coordinate the additional testing.

h. HIV 1/2 Serology tests are no longer being performed in the Immunology Section. This test is now being performed at the HIV Diagnostic Laboratory (WRAIR) in Rockville, MD. Please refer to their section in the REFERENCE LABORATORY LISTING of this manual for specific test information.

i. Hepatitis Testing Information.

(1) DO NOT order the HEPATITIS PROFILE and the HEP B PANEL if the intent is to perform all available Hepatitis testing. Doing so duplicates testing. Instead, order the HEPATITIS PROFILE and the ANTI-HBsAG test individually.

(2) Any positive HBsAG screen will be confirmed with a separate confirmatory test before the positive result is reported.

(3) The HCV serology is a screening test. Any positive result should be confirmed with an HCV-RIBA and/or HCV-PCR analysis.

IMMUNOLOGY TEST LIST

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Anti-DNA AB (Double Strand) Immunoflourescence	2 mL serum Frozen	Negative at 1:10	10 days	Synonyms: DNA, Native (DS) DNA, DS-DNA, Native Double Stranded DNA Increased Anti-DNA Antibody titers are associated with auto immune diseases such as SLE
Anti-Hepatitis B Surface Antigen EIA	2 mL serum Refrigerated	Results are quantitative – provided between the range of < 5 - > 160 mIU/mL	5 days	Synonyms: HBsAB, Anti-HBS Titers <10 mIU/mL are considered non-reactive and are indicative of a non-immune status (i.e., if an individual was vaccinated, the vaccination did not result in the generation of a successful immune response). Titers >10 mIU/mL are considered reactive and are indicative of an immune status (i.e., a successful immune response was achieved in an individual in response to vaccination or past exposure to the virus). Hepatitis B Surface Antibody is produced after vaccination or as a consequence of a successful immune response to Hepatitis B infection. Positive samples are not retested.
Anti-Nuclear Antibodies, ANA Immunoflourescence	2 mL serum Frozen	Negative at 1:40	7 days	Synonyms: ANA, ANF, FANA, Anti-Nuclear AB ANA titers less than 1:160 are generally considered to be clinically insignificant

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Anti-Streptolysin-O (ASO) Latex Agglutination	2 mL serum Refrigerated/frozen	Negative	5 days	Synonyms: Streptolysin O Antibody, Anti-Streptolysin O, ASO ASO are antibodies produced against streptolysin O, an extracellular metabolite of Group A, C, and G Streptococci. High titers of ASO can be found in cases of Rheumatic Fever and Post Streptococcal Glomerulonephritis.
Cytomegalovirus Antibody Panel **Cytomegalovirus IgM** **Cytomegalovirus IgG** ELISA	Serum Container: Red top tube, or Corvac. SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	**This test is also called CMV IgM and IgG** Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the CMV IgM and IgG test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Epstein Barr Virus Ab Panel **Epstein Barr Virus IgM** **Epstein Barr Virus IgG** **ELISA**	2 mL serum Container: Red top tube, or Corvac Shipping: FROZEN Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant	Negative	7 working days	This test is also called EBV IgM and EBV IgG Specimens that are leaking will be rejected. One tube with aliquoted serum is required solely for the performance of the EBV IgM and IgG tests. Other tests will not be performed on the serum from this tube. Interpretation: Positive, Borderline, or Negative When a Borderline result is reported, it is recommended that the patient be redrawn and retested in 2 - 3 weeks.
Hepatitis A IgM EIA	2 mL serum Refrigerated	Negative	5 days	Synonyms: Anti-HAV IgM, HAV-M, Infectious hepatitis, Anti-HAV-IgM Hepatitis A IgM Antibodies appear early in the infectious process and decline in the post infectious phase. Recent hepatitis A vaccination can cause a positive titer. Positive samples are repeated in duplicate.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Hepatitis Acute Profile EIA	3 mL serum Refrigerated	Negative	5 days	Synonyms: Acute Hepatitis Panel; Hepatitis Profile; Hepatitis A,B,C; Hep ABC Profile Profile includes HBsAg, Anti-Hepatitis B Core, HCV, and Anti-HAV IgM For interpretation, see individual tests
Hepatitis B Core Antibody EIA	2 mL serum Refrigerated	Negative	5 days	Synonyms: Anti-HBC, Total Core, HBCAB, Core AB Hepatitis B Core Antibody appears early in the infectious process and may last for years. This test is for Total Hepatitis B Core Antibodies and measures both IgM and IgG. Positive samples are repeated in duplicate.
Hepatitis B Panel EIA	3 mL serum Refrigerated	Negative	5 days	Synonyms: Hepatitis, Hepatitis B Surface Antigen, Hepatitis B Core, Hepatitis B Surface Antibody, HBc AB, HBsAG, HBsAB, Hep B Panel For interpretation, see individual tests

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Hepatitis B Surface Antigen EIA	2 mL serum Refrigerated	Negative	5 days	Synonyms: Australia Antigen, HBsAG Hepatitis B Surface Antigen appears during the incubation period of the infection (4-12 weeks) and lasts until the convalescent phase or continues in chronic cases. Positive HBsAG samples are repeated in duplicate and confirmed with the Hepatitis B Antigen Confirmation test.
Hepatitis C Antibody EIA	2 mL serum Refrigerated	Negative	5 days	Synonyms: Anti-HCV, HCV, Hepatitis C, Hep C Hepatitis C Antibody appears 8-9 weeks after exposure. Positive samples are re-tested in duplicate. Positive results may be confirmed with the HCV RIBA test or the HCV PCR test. HCV AB levels, LFT's, and HCV RNA may vary independently of each other. Not all HCV patients have elevated ALT's, and HCV RNA may not always be detectable in HCV AB positive patients.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Herpes Simplex Virus Antibody Panel **Herpes Simplex Virus IgM** **Herpes Simplex Virus IgG** ELISA	2 mL serum Container: Red top tube, or Corvac. SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	**This test is also called HSV IgM and HSV IgG** See **Herpes Ab Profile (LSL)** in CHCS Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the Herpes IgM and IgG test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Lyme Antibody IgG/IgM **Borrelia IgM** **Borrelia IgG** ELISA	2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	This test is also called: Lyme**'s** Disease. **Only serum IgM and IgG will be tested. CSF is ordered under a different accession.** Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the Borrelia IgM and IgG test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.** **Borderline and Positive tests will be automatically run for Western Blot confirmation testing. This test is performed in this laboratory. Western Blot testing will be performed only after a Borderline or Positive IgM or IgG is obtained.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Microsomal/Thyroglobulin Antibody Hemagglutination	2 mL serum Frozen	Thyroglobulin AB: <1:10 titer Microsomal AB: <1:100 titer	10 days	Synonyms: Thyroid Microsomal Antibody, Thyroid Thyroglobulin Antibody, Thyroid Auto-Antibodies, Microsomal Antibody, Thyroglobulin Antibody, MA/TA Antibody, Thyroid ABS Thyroglobulin and Microsomal Antibodies are associated with thyroiditis, Graves disease, hypothyroidism, and carcinoma.
Monospot-Heterophile Antibody Test Color Immunochromatic Assay	1 mL serum Refrigerated	Negative	Heterophile Antibody testing is performed each day M-F	Synonyms: Mono test, Monospot, Heterophile Ab A negative result does not necessarily mean the patient does not have Infectious Mononucleosis (IM). Some segments of the population who contract IM do not produce measurable levels of heterophile antibody. Approximately 50% of children < 4 years old may test as IM heterophile antibody negative. Specimens submitted on the weekend will be tested on Monday morning.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Mumps Antibody Panel **Mumps IgM** **Mumps IgG** ELISA	2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the Mumps IgM and IgG test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**
Rapid Plasma Reagin (RPR) Agglutination	2 mL serum Refrigerate/frozen	Non-Reactive	3 days	Synonyms: RPR, QL; Rapid Plasma Reagin, QL; RPR Positive in cases of primary or secondary syphilis. False positive results are not uncommon, and all reactive RPR tests should be confirmed with a specific treponemal antibody test such as MHATP, TP-PA, or FTA. Biological false positives may occur in cases of viral and bacterial infections, infectious mononucleosis, pregnancy, atypical pneumonia, SLE, rheumatoid arthritis, leprosy, malaria, lymphoma, myeloma, and narcotic addiction. **Positive samples will be titered.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Rheumatoid Factor Latex Agglutination	2 mL serum Refrigerated/frozen	Negative	5 days	Synonyms: RF, RA Rheumatoid Factor is IgM, IgA, and IgG antibodies with reactivity to the crystallizable fraction of IgG. Latex agglutination detects only the IgM antibodies. Rheumatoid Factor may be found in cases of Rheumatoid Arthritis, Sjogrens Syndrome, Mixed Connection Tissue Disease, Scleroderma, Subacute Bacterial Endocarditis, Leprosy, Pulmonary Fibrosis, and Pulmonary Silicosis.
Rubella IgG ELISA	2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the Rubella IgG test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Rubella IgM ELISA	2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the Rubella IgM test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Rubeola Antibody Panel **Rubeola IgM** **Rubeola IgG** ELISA	2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	This test is also called: Rubeola AB, Rubeola titer, Measles titer, Rubeola IgM/IgG. **Specimens can be ordered for Rubeola IgM or Rubeola IgG or Rubeola AB (which includes both IgM and IgG). If you want both Rubeola IgM and IgG, order Rubeola AB** Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the Rubeola IgM test OR the Rubeola IgG tests OR the Rubeola AB test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
TORCH PANEL **Toxoplasmosis IgM/IgG** **Rubella IgM/IgG** **Cytomegalovirus IgM/IgG** **Herpes virus IgM/IgG** ELISA	AT LEAST 2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: AT LEAST 2 mL SERUM IS MANDATORY since at least 10 tests are performed on this one tube of serum; no preservative; and/or anticoagulant.	Negative	7 working days	**TORCH has been applied to detecting acute infections in pre-pregnant or pregnant women that could have detrimental effects on the fetus and immune status.** Specimens will be rejected when leaking. **One tube with aliquoted serum is required solely for all of the TORCH tests. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Toxoplasmosis Antibody Panel **Toxoplasma IgM** **Toxoplasma IgG** ELISA	2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	Specimens will be rejected if leaking. **One tube with aliquoted serum is required solely for the Toxoplasma IgM and IgG tests. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**
Treponema Pallidum Particle Agglutination (TP-PA) Agglutination	2 mL serum Refrigerated/frozen	Non-Reactive	10 days	Synonyms: MHATP, FTA TP-PA is a specific agglutination test for syphilis. It is positive in primary, secondary, and tertiary syphilis. This test should not be used for screening purposes.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Varicella Zoster Antibody Panel **Varicella Zoster IgM** **Varicella Zoster IgG** ELISA	2 mL serum Container: Red top tube, or Corvac SHIPPING: Frozen Lab Processing Instructions: 2 mL serum; no preservative and/or anticoagulant.	Negative	7 working days	This test is also called: Chicken pox, Herpes Zoster, VZV AB, VZV Titer, VZV IgM/IgG, Varicella AB Virus. **Specimens can be ordered for Varicella IgM or Varicella IgG or Varicella AB (which includes both IgM and IgG). If you want both Varicella IgM and IgG, order Varicella AB** Specimens that are leaking will be rejected. **One tube with aliquoted serum is required solely for the Varicella IgM test OR the Varicella IgG test OR the Varicella AB test. Other tests will not be performed on the serum from this tube.** **Interpretation: Positive, Borderline or Negative.** **When a Borderline result is reported, it is suggested that the patient be redrawn and retested in 2-3 weeks.**

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
VDRL Agglutination	1 mL CSF Refrigerated	Non-Reactive	Performed on a STAT basis during the work week (i.e., M-F). If ordered on the weekend, the test will be performed Monday morning.	Positive in cases of primary and secondary syphilis and in the majority of cases of tertiary syphilis. VDRL is the only approved test for CSF specimens. Biological false positives may occur in cases of viral and bacterial infections, infectious mononucleosis, pregnancy, atypical pneumonia, SLE, rheumatoid arthritis, leprosy, malaria, lymphoma, myeloma, and narcotic addiction. **Positive samples will be titered.**

13. VIROLOGY

a. General Information.

(1) Turn around times start with arrival of the specimen in our lab.

(2) For all frozen specimens: repeated freezing and thawing may affect the diagnosis.

(3) Viral Isolation.

(a) Turnaround times for viral cultures are up to 1 month (some viruses grow slowly and the identification also needs some time!).

(b) We offer a Herpes (simplex) culture isolation (for HSV isolation only!) where the TAT is 7 working days. This test is not suitable for VZV (Herpes zoster), since VZV is a slow growing virus.

(c) For viral cultures: no report in CHCS is to be interpreted as "no growth detected to that time."

b. Source of specimen: Illness and Associated Viral Agents.

(1) When a presumptive diagnosis of a viral infection is established, the collection of specimens for viral isolation and/or detection of its components should be initiated. Most commonly, these will be specimens from the throat, nasopharynx, eyes, nose, genitalia and rectum.

(2) Specimens from specific sites, such as cerebrospinal fluid, bronchial and pericardial aspirates, swabs from lesions, stool, biopsy and autopsy specimens, may be submitted as appropriate.

RESPIRATORY DISEASES

ILLNESS	ASSOCIATED VIRAL AGENTS	PREFERRED SPECIMENS
Upper Respiratory Illness	Parainfluenza viruses Adenoviruses Rhinoviruses Respiratory Syncytial Virus Echoviruses Coxsackie viruses Reoviruses Rhinoviruses	Throat, Nasopharynx, Stool (Entero group)
Exudative Tonsillopharingitis	Adenoviruses	Throat, Stool
Pharyngoconjunctival Fever	Adenoviruses	Throat, Stool
Herpangina, Stomatitis w/wo Pharyngitis	Coxsackie viruses, Group A&B Herpes Simplex	Throat, Stool (Entero group)
Bronchiolitis	Respiratory Syncytial virus Parainfluenza viruses Influenza viruses Adenoviruses	Throat, Nasopharynx, Sputum
Croup	Parainfluenza viruses	Throat
Laryngo-tracheobronchitis	Influenza viruses, Rhinoviruses Respiratory Syncytial virus Adenoviruses	Throat, Nasopharynx

ILLNESS	ASSOCIATED VIRAL AGENTS	PREFERRED SPECIMENS
Pneumonia	Adenoviruses Respiratory Syncytial virus Influenza, Parainfluenza, Varicella, Cytomegalovirus	Throat, Nasopharynx, Sputum, Urine (CMV)
Influenza (FLU)	Influenza viruses Type A, B, and C	Throat, Nasopharynx Post Mortem Lung tissue
Pleurdynia (Bornholm disease, devil's grip, epidemic myalgia	Coxsackie viruses (Group B)	Throat, Stool, pleural effusion

CENTRAL NERVOUS SYSTEM DISEASES

ILLNESS	ASSOCIATED VIRAL AGENTS	PREFERRED SPECIMENS
Paralytic diseases	Polio viruses Types 1,2 and 3 Coxsackie viruses A9, A7 ECHO types 2 and 9	Throat, Stool and CSF, PM Brain & Cord
Aseptic Meningitis	Polio viruses, Coxsackie viruses, ECHO viruses, Herpes Simplex I and II, Mumps virus, Lymphocytic Choriomeningitis	As in paralytic diseases. Acute phase clotted blood may be submitted in cases of encephalitis.

EXANTHEMATOUS DISEASES

ILLNESS	ASSOCIATED VIRAL AGENTS	PREFERRED SPECIMENS
Herapangina with rash	Coxsackie viruses	Throat, Stool, Vesicle fluid
Hand, Foot, and Mouth Disease	Coxsackie viruses	Throat, Stool, and Vesicle fluid
Chickenpox Herpes Zoster	Varicella-Zoster virus (VZV)	Vesicle fluid, Throat
Cold sores, Herpatic lesions (vesicles)	Herpes Simplex Virus	Vesicle fluid for cold sores or Lesion swab for herpatic lesions
Nonspecific febrile illness with rash	Enteroviruses	Throat, Stool

OPHTHALMIC DISEASES

ILLNESS	ASSOCIATED VIRAL AGENTS	PREFERRED SPECIMENS
Ocular Herpes	Herpes simplex virus	Lesion, Swab of cornea and conjunctiva
Epidemic keratocunjunctivitis, Non epidemic conjunctivitis	Adenoviruses, Enteroviruses	Conjunctiva and/or Cornea swabs

MISCELLANEOUS DISEASES

ILLNESS	ASSOCIATED VIRAL AGENTS	PREFERRED SPECIMENS
Myocarditis, Pericarditis	Coxsackie viruses Group B	Throat, Stool, Urine, Pericardial fluid
Cytomegalic inclusion disease (infection)	Cytomegalovirus	Saliva, Urine
Parotidis (Mumps)	Mumps virus	Throat, Urine
Orchitis, Epidymitis	Mumps virus, Coxsackie viruses Group B	Throat, Stool, Urine
Diarrhea, Enteritis	ECHO viruses, Coxsackie viruses Bs, Adenoviruses, Reoviruses	Stool, Throat
Nonspecific febrile illness	Polio viruses, Coxsackie viruses, ECHO viruses	Throat, Stool
Vulvovaginitis, Cervixitis, Genital Herpes	Herpes Simplexvirus	Vaginal, Cervical Swabs
Viral Culture in Immunocompromised Patients	Cytomegalo virus, Herpes Simplex virus, Varicella-Zoster virus	Urine, Lesion swabs, Lesion scrapings, Blood

c. Collection, Pre Shipping Storage, and Shipping Environment of Specimens.

(1) Viral isolation or detection of viral antigens may be initiated upon observation of a viral illness.

(2) For a successful isolation of a virus or its component, it is very important that specimens are collected, handled and shipped:

(a) In a timely manner.

(b) From the proper source related to the suspected disease.

(c) The best swabs are those with a plastic shaft and plastic (foam) tips, but cotton tipped swabs are acceptable, too. The swab must be sterile and should not be pretreated with any reagent.

(d) Kept at the proper storage temperature before and during the shipments:

[1] General storage transportation conditions: Ideally, specimens should be refrigerated and arrive in the lab within 24 hours.

[2] Acceptable transportation conditions:

[a] Refrigerate upon collection and ship to the lab within 5 days (on ice), or freeze at -80°C or colder upon collection and ship to the lab within a month on dry ice. If there is no -80°C capability and the transport will take more than 5 days, the specimens may be frozen at higher temperatures (directly after collection); this will, however, reduce the viability of any viruses in the specimen. Longer storage in refrigerated conditions will also reduce the viability of any virus in the specimen.

[b] CMV, VZV and RSV are very fragile viruses that should **NOT** be frozen. However, if they are frozen, they must be frozen at -80°C or colder.

[c] Specimens should never be frozen at -20°C or warmer, since this leads to a loss of infectivity of any viruses in the specimens.

[3] If our transportation criteria cannot be met, please contact Virology for additional guidance.

(e) Virology supplies the clinics with viral transport media (VTM). However, any commercial viral transport media is acceptable. Our VTM is not suitable for other microbiological testing since it contains antibiotics.

(f) Utilizing safe specimen handing from the time of collection to the completion of the Virology laboratory investigation.

(3) Throat specimens:

(a) The most practical method to collect a throat specimen from a child is by the use of swabs. To collect a specimen, apply the swab on the left, right, and at the back of the throat. Place applied swab in a viral transport media (VTM) tube. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the VTM tubes in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at –80°C or colder.

(b) For adult patients a throat washing is the preferable specimen. To collect a throat washing, pour the contents from 2 to 3 VTM tubes in a sterile plastic urine collection cup. Alternatively, 5 ml of sterile, physiological saline can be used. Gargle the media and spit it back into the cup. Close the cup tightly and seal with parafilm. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the specimen cups in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at–80°C or colder.

(4) Stool Specimens:

Collect approximately 10 to 20 grams of feces from the bulk stool. Select locations where mucous or blood is visible. If there is no visible blood or mucous, collect the sample from a darker part of the stool and place in a sterile plastic urine collection cup. Close the cup tightly and seal with parafilm. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the specimens in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at –80°C or colder.

(5) Urine Specimens:

When urine specimens are collected for viral isolation, the first part of the urine void must be collected. Collect 10 to 20 mL of voided urine in a sterile plastic urine collection cup**.** Do NOT use VTM for urine specimens. The specimen must be unadulterated. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the specimens in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at –80°C or colder. NEVER freeze urine at -20°C or warmer as CMV, most often the virus to be isolated from urine, does not survive being frozen at -20°C or warmer.

(6) Rectal Swabs:

Rectal specimens can be collected if a stool is not available at the time of collection by applying cotton tipped swabs in the rectum. The collected swab should be placed in a viral transport media tube (VTM) and the tube should be closed tightly. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the VTM tubes in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at –80°C or colder.

(7) Lesion Swabs:

Swabs collected from the suspected viral lesions should be placed in viral transport media tubes (VTM) and the tube should be closed tightly. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the VTM tubes in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at–80°C or colder.

(8) Nasopharynx: Nasal and Nasopharyngeal Washing:

Collection of a nasal or nasopharyngeal washing can be achieved by employing the nasal wash collection kit or a sterile 5-mL syringe and a sterile urine collection cup. When a collection kit is used, follow the manufacturer's instructions. When a syringe is used, keep the patient in a sitting position and spray 3 to 5 mL of sterile water or saline solution into the nasal cavity and collect the wash fluid in a sterile urine collection cup. DO NOT transfer washes into VTM! If specimens can be shipped to arrive at the Virology Lab within 5 days, place the specimen tubes in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a Styrofoam box with dry ice or with the ice packs frozen at – 80°C or colder. **If isolation of RSV is intended, freezing is not recommended!**

(9) Pericardial Fluid, Pleural Exudate and Other Body Fluid Aspirates:

All aspirates should be collected in a sterile manner and placed in a sterile tube. DO NOT pour into VTM. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the specimens in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at –80°C or colder.

(10) Spinal Fluid (CSF):

Spinal Fluid for viral study should be shipped in the original CSF collection tube. DO NOT pour into VTM! CSF specimens must be unadulterated. In this way both viral isolation and viral serological assays can be performed. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the tubes in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at –80°C or colder.

(11) Biopsy Tissue:

Biopsy tissue should be placed in a viral transport media (VTM) tube for viral isolation studies. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the VTM tubes in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at -80°C or colder.

(12) Autopsy Tissue:

Autopsy tissue should be collected employing a sterile technique and placed in a sterile tube/cup. Each type of tissue requires a separate container. If specimens can be shipped to arrive at the Virology Lab within 5 days, place the specimens in a refrigerator after collection and ship on wet ice or with cold packs. If it is not possible to ship within 5 days, specimens should be kept at –80°C or colder after collection and shipped in a styrofoam box with dry ice or with the ice packs frozen at –80°C or colder.

d. Safe Handling of Specimens - After collection of specimens as described above, the outlying laboratories and health care providers are required to ship collected specimens in such a way to insure that no leakage or breakage occurs in transit.

(1) VTM (Viral transport media tubes) will not leak when properly sealed. Place in a rack and then ship in accordance with standard DPALS Central Processing instructions. Leaking specimens will be rejected.

(2) Urine collection cups must be sealed with parafilm and placed in a leak proof plastic bag with a zipper and then shipped in accordance with standard DPALS Central Processing instructions. Never fill the cups more than half full when specimens are required to be frozen. Leaking specimens will be rejected.

(3) When commercial collection kits are used for the collection of specimens, it is important to follow the manufacturer's instructions as described on the collection kit.

TESTS OTHER THAN VIRAL ISOLATION

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Chlamydia trachomatis/ Neisseria gonorrhoeae BD ProbeTec Note: Other sites than urethral, endocervical and urine are not cleared by FDA	Endocervical and urethral swabs: BD ProbeTec wet swab for females (order no 220142) and BD ProbeTec wet swabs for males (order no 220143). SHIPPING: All swab specimens must be shipped frozen	Negative	7 working days	Non-frozen swabs may be rejected. Specimens will be rejected if the wrong swabs are used (only swabs from BD for the ProbeTec are acceptable). Wet swabs must be carefully closed and be packed individually (one leaking specimen in a bag will lead to the rejection of the whole bag!). They must not be sealed with parafilm since parafilm will interfere with specimen processing.
Clostridium difficile Enzyme Immunoassay	Feces Container: sterile container Frozen at -80°C or refrigerated for up to 3 days	No C. difficile toxin detected	2 working days	Specimens will be rejected when leaking and when not shipped at the proper temperature.
Clostridium difficile Tissue culture test	Feces Container: Sterile Container Frozen at -80°C or refrigerated for up to 3 days. Freezing at higher (i.e., warmer) temperatures than -80°C may destroy present toxins.	No C. difficile toxin detected	5 working days	This test is also called: C difficile Toxin A+B Specimens will be rejected when leaking and when not properly shipped.
Herpes Simplex Culture	swabs, vesicle fluids	No herpes simplex virus isolated	7 working days	Herpes culture, HSV culture Be aware this test is only for HSV detection. Herpes zoster (VZV) must be ordered as viral culture since this virus usually needs more than 7 days to grow!

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Rotavirus Antigen Enzyme Immunoassay	Feces Container: sterile container Frozen at -80° C or refrigerated for up to 3 days	No Rotavirus antigen detected	2 working days	Specimens will be rejected when leaking and when not shipped at the proper temperature
Viral Culture Tissue Culture PCR if indicated/season	Swabs, biopsies, stool, aspirates, urine, CSF Container: Viral Transport Medium Note: Indicate source of specimen and type of infection/virus expected. SHIPPING and taking samples: see above or call the lab at 486-7809 for information. Viral Transport Media can be obtained from the laboratory (keep refrigerated until expiration date)	No virus isolated	4 weeks	This test is also called: Virus Culture, Viral Isolation, CMV Viral Culture, Enterovirus viral culture, Influenza viral culture, Parainfluenza viral culture, Culture Viral, Viral Culture, respiratory culture, RSV respiratory culture Specimens that are leaking/ broken or shipped at wrong conditions will be rejected.

14. **BLOOD BANK/TRANSFUSION SERVICES**

a. General Information. The Transfusion Service is located on the second floor in the laboratory complex in Building 3711. Normal duty hours are 0730-1630 hours, Monday through Friday, excluding holidays. The section operates at a reduced staffing level to handle critical testing requirements from 1630-0730, Monday through Friday and at all times on weekends, training holidays, and holidays. It is necessary to stress that routine priority specimens submitted during reduced staffing times may be processed and stored, dependent on the amount of critical workload present, until the test(s) can be performed during normal duty hours.

b. Problems, complaints, or questions should be directed through the section, up to the OIC of the Blood Bank (486-7114) or the Medical Director, Blood Bank.

c. Clerical errors are the single most common cause of serious transfusion reactions. It is absolutely essential that all Transfusion Request Forms (SF 518) be completed fully and accurately, in triplicate, before they are submitted to the Transfusion Service. The accompanying tube of blood and SF 518 from the intended recipient must be properly identified and labeled.

d. For comprehensive information on the use of blood and blood products, blood management, autologous donation, therapeutic phlebotomy, and blood transfusion practices, see LRMC Memo 40-105, Blood and Blood Product Utilization.

e. Categories of Red Blood Cell Ordering Recognized:

(1) Type and Screen: Utilized in those cases where the probability of transfusion is statistically very low and the patient does not possess any unusual antibodies. A labeled 7 mL red-top tube of patient's blood along with two (2) SF 518s marked, "Type and Screen/T&S" must be submitted to the Transfusion Service. The Transfusion Service will perform an ABO Grouping, Rh testing, and an Antibody screen for unusual/irregular antibodies on the patient's sample. The specimen and the paperwork will be held for 72 hours. Should an emergency arise and the patient require blood during this 72 hour period, an immediate spin crossmatch will be performed as soon as the Transfusion Service is notified of the need. The donor units can be released to the waiting courier in as little as five minutes after notification in an emergency. A routine complete crossmatch will always be accomplished immediately after release of the emergency units, and regular administrative paperwork will follow.

(2) Type and Crossmatch: This includes an ABO Grouping, Rh testing, an Antibody screen for unusual/irregular antibodies, and full compatibility testing. The blood usually is available within four hours of the Transfusion Service's receipt of the request and patient's specimen. If no priority is indicated, the request will be processed as routine. NOTE: Life and Death Blood Requests - In emergency situations, red blood cells can be released after a 7 mL blood sample is submitted with an SF 518. Specific blood group, type, and product issued will be determined via consultation between the Transfusion Service and the attending physician.

(3) Coomb's Test [Direct or Direct Antiglobulin Test (DAT)]: This test is a test for in vivo antibody and/or complement coating of the surface of the patient's cells. Submit lavender top tube. If the test is positive, antibody identification will be made.

(4) Coomb's Test [Indirect or Indirect Antiglobulin Test (IAT)]: This is a test to detect irregular antibodies in the patient's serum against red cell antigens. Submit a red top tube.

(5) Cord Blood Studies: ABO, Rh, Direct Coomb's test. If the Direct Coomb's test is positive, the antibody will be identified. Submit a red top tube and SF 556.

(6) Prenatal Work-up: ABO, Rh, antibody screen (Indirect Coomb's). Submit a red top tube and SF 556.

f. Ordering Blood Products.

(1) All requests for blood products must have an SF 518 for each dose requested and a MCEUL OP 157, Blood Product Issue and Utilization Form, per transfusion order (see examples at the end of this section). Type and Screens will require the MCEUL OP 157 when converted to Type and Cross. The only exception is for emergency released (uncrossmatched) blood products. For these products, the LRMC Emergency Issue Report is generated by the Transfusion Service from the DBSS computer system and is used in lieu of the SF 518.

(2) One (1) SF 518 must be completed for <u>each</u> blood product requested. For example, if 3 units of packed red blood cells are needed, then three SF 518's should be completed.

(3) One (1) MCEUL OP 157 must also accompany each request for blood product(s). This form can be used to accompany multiple product requests, i.e., for one unit of packed red blood cells **AND** one unit of apheresis platelets **AND** 1 unit of FFP **AND** 6-10 units of cryoprecipitate **IF** all are requested using the same transfusion order. **One (1) MCEUL OP 157 is required per transfusion order.**

> **NOTE:** If non-FDA licensed products are to be used (platelets; or fresh, leukoreduced, or irradiated red blood cells), an informed consent must be completed and placed in the patient's chart and 2 red top tubes must be collected before the transfusion is initiated to allow baseline tests for HBV, HCV, HTLV I/II, and Syphilis to be performed, if possible. Additionally, 3, 6, and 12 month follow-up testing dates must also be projected in the patient's chart for post-transfusion viral market testing. For complete instructions and compliance processes, see LRMC Memo 40-105, Section 18, pages 17 and 18.

(4) The Blood or Blood Component Transfusion form, SF 518, must contain the following information in addition to the information provided for clinical test requests:

(a) Component requested.

(b) Date requested.

(c) Date and hour blood product is required.

(d) Known antibody formation/transfusion reaction.

(e) Requesting physician.

(f) Diagnosis or operative procedure.

(g) Phlebotomist's signature.

(h) Date specimen drawn.

(i) Time specimen drawn.

(5) Specimen containers must be labeled with the following information:

(a) Patient's first and last name.

(b) Family member prefix and complete SSN.

(c) Full signature of phlebotomist.

(d) Date and time specimen collected.

(e) Male or Female and Ward where patient is located.

(6) To enter requests for Blood Products in CHCS (CHCS screen prompts are bolded in the following subparagraphs):

(a) **ACTION:**

Press N and <Return> to enter new orders.

(b) **SELECT ORDER TYPE:**

[1] Type LAB and press <Return> to enter Laboratory orders.

[2] NOTE: You may write cross-divisional Laboratory orders for inpatients. The system displays the notification "You are placing this order at a location within [division name]." during the entry of cross-divisional Lab orders for inpatients.

[3] The system displays the following message and prompts:

CHOOSE DEFAULTS (OR PRESS <RETURN> FOR FULL-SCREEN ENTRY)

DATE/TIME OF TEST (NOW, AM, QAM, or DATE&TIME):

[4] Press <Return> to specify full-screen entry. (Blood Bank Lab orders require full-screen entry. See Reference Sample Screens in the On-Line Users Manual of CHCS.)

(c) **SELECT LABORATORY TEST:**

Enter the laboratory test name **(use NOT DBSS options)** and press <Return>.

(d) **DATE/TIME NEEDED:**

Either press <Return> to accept the default or enter the date and time needed and press <Return>.

(e) **SCHEDULE TYPE:**

Either press <Return> to accept the default or enter when needed and press <Return>.

(f) **COLLECTION METHOD:**

Either press <Return> to accept the default or enter the collection method and press <Return>.

(g) **COLLECTION PRIORITY:**

Either press <Return> to accept the default or enter the collection priority and press <Return>.

(h) **LAB PROCESSING PRIORITY:**

Either press <Return> to accept the default or enter the processing priority and press <Return>.

(i) **ORDER COMMENT:**

A 60-character free-text field to list any information to explain the circumstances or reason for the order.

(j) **FILE/EXIT/ABORT/EDIT**

Press F to file the data.

(k) The system redisplays the **SELECT LABORATORY TEST:** prompt.

Either enter another laboratory test **(use NOT DBSS options)** and press <Return> or press <Return> to return to the **SELECT ORDER TYPE:** prompt or press <Return> twice to return to the **ACTION:** prompt.

g. Processing Blood Product Requests:

(1) Once the specimen has been signed into the laboratory specimen log, it must be taken directly to the Transfusion Service and personally handed to a technologist or technician working in the Transfusion Service. The technologist/technician will examine the specimen and the request form (SF 518) for suitability before accepting or rejecting the specimen.

(2) If there is a patient identification error on either the specimen label or the SF 518, the specimen WILL BE DISCARDED, and a new, properly labeled specimen required. If there are other clerical errors on the request form or specimen label, only the individual responsible for collecting the specimen may come to the Transfusion Service and make the necessary corrections. The corrections must be made before the Transfusion Service will perform compatibility testing using the specimen (unless a life-or-death emergency exists).

(3) The name and/or SSN will never be changed on a specimen submitted to the Transfusion Service for any reason, and a specimen or request form with patient identification errors will never be used for compatibility testing. If a life-or-death emergency exists, uncrossmatched blood can be released.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
ABO/RH (Blood Typing) Tube method	1 full 7 mL red top tube If shipped, separate serum from cells. Place both serum and red cells on ice. (Do not freeze).	Blood Type: A,B,AB, or O Rh: Positive or negative	8 hours	Do not use tubes with silicon gel.
Antibody Screen Tube method.	1 full 7 mL red top tube If shipped, separate serum from cells. Place both serum and red cells on ice. Freeze serum if specimen will be enroute greater than 48 hours. (Do not freeze red cells).	Negative	8 hours.	Do not use tubes with silicon gel.
DAT (Antihuman globulin test, Direct Coomb's test) Tube method	Adult: Whole blood – EDTA Lavender top tube Newborn Cord blood – **plain red top tube** Ship on ice. (Do not freeze or separate serum from cells).	Negative	8 hours	None
Prenatal Work-up Tube method	1 full 7 mL red top tube If shipped, separate serum from cells. Place both serum and red cells on ice. Freeze serum if specimen will be enroute greater than 48 hours. (Do not freeze red cells).	Blood Typing – See above Indirect Coomb's: Negative Direct Coomb's: Negative	8 hours	Do not use tubes with silicon gel.

Proper Format for SF 518, Blood or Blood Component Transfusion
(Form not intended for reproduction)

MEDICAL RECORD	BLOOD OR BLOOD COMPONENT TRANSFUSION

SECTION I – REQUISITION

COMPONENT REQUESTED (Check One)	TYPE OF REQUEST (Check ONLY if Red Blood Cell Products are requested)	REQUESTING PHYSICIAN (Print) SMITH, DOCTOR
☐ RED BLOOD CELLS ☐ FRESH FROZEN PLASMA ☐ PLATELETS (Pool of _____units) ☐ CRYOPRECIPITATE (Pool of _____units) ☐ Rh IMMUNE GLOBULIN ☐ OTHER (Specify_____)	☐ TYPE AND SCREEN ☐ CROSSMATCH	DIAGNOSIS OR OPERATIVE PROCEDURE SPLENECTOMY
	DATE REQUESTED *TODAY'S DATE*	I have collected a blood specimen on the below named patient, verified the name and ID No. of the patient and verified the specimen tube label to be correct
	DATE AND HOUR REQUIRED *DATE WHEN UNIT IS NEEDED*	
VOLUME REQUESTED (If applicable) _____ ML	KNOWN ANTIBODY FORMATION/ TRANSFUSION REACTION (Specify)	SIGNATURE OF VERIFIER SIGNATURE
REMARKS:	IF FEMALE, IS THERE HISTORY OF: RHig Treatment ? Date given_____ Hemolytic Disease of Newborn?_____	DATE VERIFIED *DATE SPECIMEN COLLECTED* TIME VERIFIED *TIME SPECIMEN COLLECTED*

SECTION II – PRE – TRANSFUSION TESTING

UNIT NO.	TRANSFUSION NO. PATIENT NO.	TEST INTERPRETATION		PREVIOUS RECORD CHECK: ☐RECORD ☐NO RECORD
		ANTIBODY SCREEN	CROSSMATCH	

DONOR	RECIPIENT	☐CROSSMATCH NO REQUIRED FOR THE COMPONENT REQUESTED	DATE:
ABO Rh	ABO Rh	REMARKS:	

SECTION III – RECORD OF TRANSFUSION

PRE-TRANSFUSION DATA		POST-TRANSFUSION DATA			
INSPECTED AND ISSUED BY (Signature)		Amount Given ML	TIME/DATE COMPLETED/INTERRUPTED		
AT(Hour)	ON (Date)	REACTION ☐ NONE ☐ SUSPECTED	TEMPERATURE	PULSE	BP

IDENTIFICATION	If reaction is suspected – IMMEDIATELY:
I have examined the Blood Component container label and this form and I find all information identifying the container with the intended recipient matches item by item. The recipient is the same person named on this Blood Component Transfusion Form and on the patient identification tag	1. Discontinue transfusion, treat shock if present, keep intravenous line open 2. Notify Physician and Transfusion Service 3. Follow Transfusion Reaction Procedures 4. Do NOT discard unit. Return Blood Bag, Filter Set, and IV solutions to the Blood Bank

1st VERIFIER (Signature)		DESCRIPTION OF REACTION	
2nd VERIFIER (Signature		☐URTICARIA ☐CHILL ☐FEVER ☐PAIN ☐OTHER (Specify)	
PRE-TRANSFUSION TEMP. PULSE BP		OTHER DIFFICULTIES (Equipment, clots, etc.) ☐ NO ☐ YES (Specify)	
DATE OF TRANSFUSION	TIME STARTED	SIGNATURE OF PERSON NOTING ABOVE	
Last Name, First Name MI FMP/ Full Social Security Number of Sponsor		SEX *MALE OR FEMALE*	WARD *14CD*
		BLOOD OR BLOOD COMPONENT TRANSFUSION MEDICAL RECORD STANDARD FORM 518	

Proper format for MCEUL OP 157, Blood Product Issue & Utilization Form (Front)
(Form not intended for reproduction)

MEDICAL RECORD SUPPLEMENTAL MEDICAL DATA
For use of this form, See AR 40-66, the proponent agency is the Office of the Surgeon General

BLOOD PRODUCT ISSUE & UTILIZATION FORM	OTSG APPROVED (Date)

DIAGNOSIS/PROCEDURE: _____ PHYSICIAN:_____ WARD:_____

WRITTEN ORDER FOR TRANSFUSION? ____ YES ____ NO (Explain):
INFORMED CONSENT DOCUMENTED? ____ YES ____ NO (Explain):

Check AT LEAST ONE BLOCK under BLEEDING OR NON-BLEEDING PATIENT for the product requested:

PRODUCT	BLEEDING PATIENT	NON-BLEEDING PATIENT	FOLLOW-UP
PACKED RED BLOOD CELLS	☐ Acute blood loss >15% of blood volume ☐ EBL > 1000-1200 ml ☐ Bleeding from hard to control site (e.g., GI) ☐ Hgb/Hct < 10g/dl / 30% ☐ Other (explain):	☐ Hgb/Hct < 10g/dl / 30% in patient with concurrent disease (ASCVD, CVD, VHD, CHF, AS, ARDS, Sepsis, Age>60) ☐ Hgb/Hct < 7g/dl / 21% in patient with no concurrent disease ☐ Other (explain):	Hgb/Hct following transfusion of each dose Expected: Increase in HCT of app. 3% per unit of PRBC
FRESH FROZEN PLASMA	☐ Massive transfusion (> 1 blood volume replacement within 24 hour period) ☐ Uncontrolled diffuse oozing ☐ PT >14 with life threatening bleeding from hard to control site (e.g., GI) ☐ PT > 17 sec / APTT > 55 sec ☐ Coumadin reversal ☐ Other (explain):	☐ PT > 17 sec / APTT > 55 sec ☐ PT > 14.5 sec / APTT > 52 sec for closed biopsies ☐ Specific coagulation deficiency prior to planned invasive procedure ☐ Plasma exchange for TTP or HUS ☐ Other (explain):	PT/APTT or specific coagulation assay within 4 hours following each dose Expected: Correction of PT/APTT
PLATELETS	☐ Massive transfusion (> 1 blood volume replacement within 24 hour period) with continued bleeding ☐ Uncontrolled diffuse oozing ☐ PLT < 50,000 with bleeding ☐ Other (explain):	☐ PLT < 50,000 with planned invasive procedure ☐ PLT <80-100,000 prior to open heart, neurolgic or ophthalmologic surgery ☐ PLT < 20,000 in patient with concurrent disease ☐ Other (explain):	Platelet count within 2 hours following each dose Expected: Increase of 7-10 x 10^6 plts/ml following each dose
CRYO-PRECIPITATE AHF	☐ Fibrinogen < 100mg/dl ☐ Fibrinogen < 125 mg/dl with evidence of DIC, or uremia ☐ Uncontrolled diffuse oozing ☐ Other (explain):	☐ Preparation of fibrin glue for surgery ☐ Other (explain):	Fibrinogen assay within 12 hours following each dose Expected: Increase of 5 mg/dl per unit transfused (pool of 10 = ? 50 mg/dl)

For use as a pre-transfusion note, PHYSICIAN MUST SIGN: _____ ***(Continue on reverse)***

PREPARED BY (SIGNATURE & TITLE)	DEPARTMENT/SERVICE/CLINIC	DATE
PATIENT'S IDENTIFICATION LAST NAME, FIRST NAME MI *FMP/ FULL SOCIAL SECURITY NUMBER OF SPONSOR*	☐ HISTORY/PHYSICAL ☐ FLOW CHART ☐ OTHER EXAMINATION OR EVALUATION ☐ OTHER (Specify) ☐ DIAGNOSTIC STUDIES ☐ TREATMENT	

Proper format for MCEUL OP 157, Blood Product Issue & Utilization Form (Back)
(Form not intended for reproduction)

POST TRANSFUSION NOTE:

THE PATIENT WAS TRANSFUSED WITH: _____ units PRBC _____ units PLATELETS
_____ units FFP _____ CRYOPRECIPITATE
OTHER (Explain):

FOLLOW-UP LAB DATA (As appropriate):

HGB: _____ HCT _____ PLTS _____ PT _____ APTT _____ FIBRINOGEN _____

CLINICAL RESPONSE (REQUIRED):

☐ The patient tolerated the transfusion well, without complications
☐ The patient had an appropriate clinical improvement
☐ Other (explain):

Transfusion Reaction? ☐ No ☐ Yes (explain):

PHYSICIAN SIGNATURE: _____

(Stamp or Print Name)_____

PURPOSE: This form was approved by the LRMC Blood Utilization Committee (BUC) to comply with JCAHO and AABB requirements to review blood transfusions with the goal of improving patient care outcomes. This form is not an order to transfuse blood, but rather a transfusion utilization form designed to facilitate prospective review combined with retrospective audit. A Consent Form and physician's written order for transfusion must still be recorded in the patient's chart prior to transfusion. This form also serves as a pre & post transfusion note for the chart.

INSTRUCTIONS:
1. Completely fill out and sign front of form for products to be crossmatched and/or transfused. For most cases, one form should be submitted for each dose of blood product to be released from the Transfusion Service at one time.
2. Send the form to the Transfusion Service with the SF 518 when requesting blood products or crossmatch.
3. The form will be returned to the ward with the SF 518 and the blood product.
4. The form can serve as the required "pre-transfusion note" for the patient chart.
5. After the transfusion, fill out the "post-transfusion note" on the back of the form and sign.
6. Ensure the form is placed in the patient chart.
7. The following must be completed before blood products will be issued:
   a. Full patient identification
   b. Printed ordering physician Name, Service/Dept, Location
   c. Date/time requested for transfusion
   d. Current diagnosis
   e. Current indication(s) for transfusion

FOR TRANSFUSION SERVICE ONLY:

Date/Time Issued: _____ Pass initial screen? ☐ Yes ☐ No
BB Tech Initials:_____ OR
Pathologist approved? ☐ Yes ☐ No Pathologist: _____

15. **HISTOLOGY**

a. General – Surgical Pathology Specimens.

(1) Submission Requirements.

Generally, all tissue removed from patients at Landstuhl Regional Medical Center must be submitted to the Anatomic Pathology Service for examination. For exceptions, please call the Anatomic Pathology Service (486-7269/6402) for clarification.

(2) Standard (Universal) Precautions.

All specimens should be treated with standard (universal) precautions as potentially infectious.

(3) Container Labeling - All specimen containers must be labeled with the following information in a legible fashion:

(a) Patient's full name and Social Security Number (including Family Member Prefix).

(b) Submitting facility (ward/clinic/outlying clinic or location), (e.g. Bosnia).

(c) Date obtained.

(d) Anatomic site from which the specimen was taken (e.g. liver).

(e) Submitting physician's name.

(f) A precautionary label for specific fixative (e.g. 10% neutral buffered formalin, B-5. Etc.).

(4) Separate Containers.

Specimens from separate anatomic sites must be submitted in separate containers, each specifically labeled as to anatomic site.

(5) Container Size.

Specimens should easily fit within the selected container, allowing adequate room for fixative, and must have a lid that is leak proof. Adequate room for fixation is a container that will hold 15-20 times the volume of fixative to that of the specimen. Acceptable containers include plastic, prefilled fixative containers in various sizes, and small and large plastic buckets.

(6) Remote Laboratories.

Specimens from remote laboratories should be submitted in tightly sealed, double lipped containers and transported in another leak proof container filled with an absorbent pad or other absorbent material. All specimens must be appropriately labeled.

(7) Specimen Fixative.

(a) All routine surgical specimens should be submitted in 10% neutral buffered formalin unless otherwise required for particular tissue types or specimens.

(b) The ratio of fixative to tissue should be no less than 15 - 20:1. Adequate fixative is extremely important! Tissue stored in the fresh state, saline, alcohol, or water is subject to degeneration, which severely compromises diagnostic pathology studies.

(8) Fixative Hazards.

EXTREME CAUTION SHOULD BE EXERCISED WHEN HANDLING TISSUE FIXATIVES. Fumes should be avoided and tissue should be gently added to the container to avoid splashing. Many fixatives contain Formaldehyde, A POTENTIAL CARCINOGEN.

b. Consultative Request Form and Information.

(1) CHCS Ordering Guidelines. In accordance, with JCAHO requirements, all specimens must be ordered in the Composite Health Care System (CHCS), if available. An order may be placed in CHCS by using the following key strokes under the Nursing, Physician or Allied Health Menu (CHCS prompts are bolded in the following subparagraphs).

(a) Select Clinical System Menu Option: Physician Menu.

(b) Enter ORE (Enter/Maintain orders), press <Return>.

(c) **Select Patient Name: ??**

(d) **Select Requesting Location: ??**

(e) At **Action:** prompt, type N for New action.

(f) **Select order type:** enter LAB.

(g) **Select Ordering/Authorizing HCP: ??** Enter the name of the ordering HCP.

(h) At the **Date/Time of Test:** Enter the date/time the specimen was obtained.

(i) At the **Select Laboratory Test:** prompt, type Tissue Exam.

(j) Accept the **Specimen Collection Date:** prompt default, if correct.

(k) Accept the **Processing Priority:** prompt default, if correct. Surgical cases are never done on a STAT basis. We can process ASAP but it would be best to call ahead with those types of specimens.

(l) Enter the container number, always beginning with number 1 container "A", and then enter the specimen Description. Ensure that the specimen description identifies the source of specimen.

(m) Enter YES at the **Frozen:** prompt only if a specimen for a frozen section is to be submitted.

(n) At the **Clinical History (BRIEF):** prompt, enter the patient history.

(o) At the **Preoperative Diagnosis:** prompt, enter the diagnosis.

(p) At the **Operative Findings:** prompt, enter the findings.

(q) At the **Post Operative Diagnosis:** prompt, enter the diagnosis.

(r) At the **File/Exit:** prompt, file the order. Return to the **Action:** prompt.

(s) At the **Action:** prompt, enter Q for quit.

(2) Submission Guidelines if CHCS is not Available. In the event that CHCS is unavailable, all specimens must be accompanied by a Tissue Examination Request form (SF 515) (see example at the end of this section) and must include the following information written legibly:

(a) Patient's full name and Social Security Number (including Family Member Prefix).

(b) Date specimen collected.

(c) Requesting physician's name.

(d) Patient's location (ward, clinic or remote area).

(e) Anatomic site specimen from where the specimen was removed.

(f) Patient's age.

(g) Pertinent clinical information to include clinical history and preoperative, operative, and postoperative findings.

(3) Incomplete specimen labeling or Tissue Examination Request forms (SF515) (see example at the end of this section) will be referred back to the submitting physician for completion and tracked within the Anatomic Pathology Service Quality Improvement Program.

(4) Completed SF 515 must be submitted with specimens received from remote areas that do not have access to CHCS. The SF 515 should be sent with the specimen but placed in a protective bag separate from the specimen.

(5) The location of the remote area should be included on the specimen label and on the SF 515.

c. Request for Multiple Specimens.

One tissue exam form (SF 515) (see example at the end of this section) may generally be used for multiple specimens from the same patient, provided they are obtained from the same procedure or procedures performed at the same time.

d. Specimen Submission Location.

(1) During normal duty hours, all specimens will be transported as soon as possible to the Histology laboratory (room G202) located in Anatomic Pathology (486-7269/6402) in the main laboratory complex on the second floor of Bldg 3711.

(2) During non-duty hours (weekends, evenings, training holidays, and holidays), specimens must be placed in the proper container with fixative and held by the submitting ward or clinic and then transported to the Anatomic Pathology Service during normal daytime duty hours or transported to the laboratory specimen drop-off area in Building 3711, 2nd floor. Unfixed (fresh) specimens require notification of the Pathologist on call. Call the laboratory at 486-7500/7114 to have the Pathologist paged.

e. Diagnostic Loan Material.

(1) Non-LRMC Pathology Consultative Reports or Glass Slides. On occasion, glass slides/paraffin embedded tissue is referred to Landstuhl Regional Medical Center in support of patient care, corroboration of previous diagnoses, medical education, or research. Formal review of such diagnostic loan material is provided by the Anatomic Pathology Service.

(2) Formal Review.

(a) For formal review, "loaned" diagnostic material must be accessioned by Histology staff and given a LRMC case number. Any loaned material must be accompanied by all corresponding surgical pathology consultative reports.

(b) Final diagnosis will be provided as soon as possible, but will not be treated as a priority case.

(3) Formal Review Requirement.

All patients receiving definitive therapy, based upon a non-LRMC pathologic diagnosis, should have such diagnostic material made available to the Anatomic Pathology Service at LRMC. It is the responsibility of the LRMC clinical HCP to obtain such material and make it available for LRMC pathologist review. Major medical treatment pursuant to the outside facility diagnosis should not be undertaken until such review is completed. Failure to do so engenders certain medical and/or legal risk.

f. Intraoperative Consultation (Frozen Sections).

(1) Frozen Section Examination Indications.

The purpose of the intraoperative consultation using the frozen section technique is to render diagnostic information for immediate therapeutic decisions or, less frequently, patient counseling. The procedure is very labor intensive with tissue sampling being relatively limited, technically difficult, and the technique results in suboptimal light microscopy due to freezing artifacts and other limitations of the procedure.

(2) Frozen Section Examination Availability.

This service is available at all times with staff pathologists assigned during duty or non-duty hours. The pathologist assigned to frozen sections can be reached via the Histology personnel during duty hours and via lab personnel during off duty hours.

(3) Frozen Section Examination Tissue Submission Requirements.

(a) Tissue should be submitted without fixative in a container of appropriate size and labeled as described in paragraphs above. In addition, the letters "FS" should appear on the label to indicate frozen section. Each submitted specimen should be accompanied by a SF 515 containing the following information:

[1] Patient's stamp plate information including full name, identification number, and ward or clinic.

[2] Patient's age, race, and sex.

[3] Anatomic site and procedure.

[4] Operating room number and telephone number.

[5] Submitting physician and pager number.

[6] Pertinent clinical history to include pre-operative and intraoperative impressions.

[7] Any specific questions that need to be addressed at frozen section examination (for example, surgical margins).

(b) If multiple frozen sections are submitted during a given procedure, each specimen should be sequentially labeled with the letters A, B, C, etc. Should all sequential letters be used (A through Z), specimens will then be designated sequentially by numbers (e.g., 1, 2, 3….).

(c) At the conclusion of the procedure, a completed copy of the Tissue Examination Request form (SF 515) (see example at the end of this section) shall be submitted with any additional specimens. This form must clearly indicate each specimen with appropriate letter designation, the anatomic site, and the letters "FS" for specimen parts submitted for frozen section examination.

(4) Frozen Section Examination Tissue Submission Location.

(a) During normal duty hours, tissue submitted for frozen section should be sent immediately to the Histology laboratory (room G202).

(b) During non-duty hours, the pathologist on call must be given advance notification of an impending frozen section examination, ideally 1 hour prior to tissue removal. The "on call" pathologist can be reached by contacting lab personnel. If the pathologist has not arrived by the time the specimen is delivered to the laboratory, the specimen should be transported to the laboratory and placed in the refrigerator until the pathologist arrives.

(5) Frozen Section Examination Results.

All frozen section diagnostic results will be called to the operating room or the submitting physician's pager as soon as they are available. To ensure notification, always include the physician phone or pager number on the SF 515. Generally, physician notification is within 20 minutes of receiving the specimen in the Histology laboratory.

g. Lymph Nodes and Spleen.

(1) Tissue Examination Requirements.

(a) All hematopoetic tissue removed for potential lymphoproliferative disease requires unique processing and must be submitted unfixed (fresh) to the Histology laboratory (room G202) using the same procedures as for frozen section tissue examination.

(b) Following unfixed tissue examination by the pathologist, specific tissue processing protocols may be initiated. Definitive frozen section examination diagnoses will not be rendered.

(2) Tissues exempt from specific protocol examinations include lymph node dissections for non-hematopoetic malignancies and spleens removed incidentally or for trauma.

h. Points of Contact.

(1) CHCS Mail group: LSL LAB HISTO (accessible by Central European CHCS users only).

(2) Phone Numbers:

(a) Histology Laboratory :
DSN 486-7269/6402
Civilian: 06371-86-7506/6402

(b) Anatomic Pathology Secretary Numbers:
DSN: 486-7492/7182
Civilian: 06371-86-7492/7182

(3) Mailing Address:

Via US Mail (USPS), Military Postal Service (MPS), or Military Air Lift

Commander
Landstuhl Regional Medical Center
CMR 402
ATTN: MCEUL-P-Histology
APO AE 09180

Via FedEx and DHL

Commander
US Army Hospital - Landstuhl Regional Medical Center
ATTN: MCEUL-P-Histology
Gebaude 3711, Zimmer G202
66849 Landstuhl/Kirchberg

i. NOTES:

Hazardous Substance Labeling Requirements - Labeling requirements are found in 29 CFR 1910.1200.

Proper Format for SF 515, Tissue Examination
(Form not intended for reproduction)

MEDICAL RECORD	TISSUE EXAMINATION

SPECIMEN SUBMITTED BY **Ward or Clinic**	DATE OBTAINED **Must Fill Out**
SPECIMEN **Tissue (Tonsils, Appendix etc)**	
BRIEF CLINICAL HISTORY (Include duration of lesion and rapidity of growth, if a neoplasm) **Brief Clinical History**	
PREOPERATIVE DIAGNOSIS **Appendicitis**	
POSTOPERATIVE DIAGNOSIS **Appendicitis**	SIGNATURE AND TITLE **Need doctor's full name and signature**

PATHOLOGICAL REPORT

NAME OF LABORATORY	ACCESSION NO(S).

(Gross description, histologic examination and diagnoses)

(Continue on reverse side)

SIGNATURE OF PATHOLOGIST	DATE

AGE	SEX	RACE	REGISTER NO.	WARD NO.	IDENTIFICATION NO.

Patient's identification (For typed or written entries give: Name – last, first, middle, grade; rank; rate; hospital or medical facility)

TISSUE EXAMINATION

Medical Record

STANDARD FORM 515 (REV 7-91)
Prescribed by GSA/ICMR, FIRMR (41CFR 201-9.202-1

16. **CYTOLOGY**

a. General Information.

(1) This manual establishes guidelines for the submission of specimens for cytopathology examination.

(2) Cytology is located in the main laboratory complex in Building 3711, on the second floor above the Emergency Room. The section is routinely staffed only during normal duty hours, i.e., 0730-1630, Monday-Friday, excluding holidays and training holidays.

b. Delivery of Specimens.

(1) Duty hours - Main Hospital and clinic specimens are to be delivered to the Cytology Laboratory (room F204) anytime during normal duty hours (M-F, 0730-1630 hrs.). Specimens should be delivered to the laboratory as early in the day as possible to enable processing of specimens on the same day.

(2) Non-duty hours – (Includes holidays, training holidays, weekends, and before and after the duty hours listed above). HCP's should make every effort to coordinate the collection and submission of Non-Gynecological specimens (i.e., FNA's, bronchial, gastric, CSF, etc.) during duty hours. This will help circumvent specimen integrity issues.

c. Procedure.

(1) Specimens are accepted only with valid orders from physicians or other healthcare providers as authorized by law. Call Cytology at 486-6261/8825/7491 for more information.

(2) Labeling of Specimens: All specimens must be submitted in a properly labeled container to include the patient's name, social security number, physician's name, and hospital ward or clinic. All slides submitted (GYN smears, bronchial brush smears, nipple discharge smears, tumor aspirate smears, etc.) must be identified by writing the patient's full name and full Social Security Number on the frosted end of the slide with a #2 or #3 lead pencil.

(3) Every facility, with few exceptions, is able to register and order Cytology tests in the Landstuhl CHCS system. If a contributor does not have this capability, the Cytology supervisor should assist the Medical Treatment Facility (MTF) by contacting Tina Coffman in the Information Management Division (IMD) at 486-8852 to establish an account for the contributor.

(4) When a Health Care Provider is unable to register and order patients into the Landstuhl CHCS system, they MUST, at a minimum, complete the Cytology Local specimen submission form on the specimen prior to distribution. (Contact the Cytology supervisor for these forms.) A completed Contributor's List must accompany this request.

(5) Facilities that ARE on CHCS submitting Non-Gyn specimens will order the test in the CHCS computer and print a "Lab Order" to send with the specimen.

d. Submission of PAP smears.

(1) For CONVENTIONAL SMEARS, use a #2 pencil to label each slide (**NOTE: The use of conventional smears is now strongly discouraged <u>unless</u> the smears are to be submitted from a remote location which either does not have liquid-based cytology collection supplies or which cannot get the collected liquid-based cytology specimens to Landstuhl within the specimen viability window. Since the PAP smear and HPV test, if required, must be performed within 21 days of specimen collection, Landstuhl must receive liquid-based cytology specimens NLT 14 days after collection.)**. For both conventional and THIN PREP PAP smears, the following information must be provided on the specimen and in the format provided: LAST NAME, FIRST NAME, FAMILY MEMBER PREFIX, FULL SSN.

(2) All clinics with access to CHCS will provide a computer generated PAP list (shipping document/order list), using the LPL option to obtain a complete listing of patients and corresponding PAP smears in every batch of slides submitted to the cytology section.

(3) Clinics that do not have access to our CHCS platform must submit completed Local PAP smear request forms (SF 541) (see example at the end of this section) with each specimen. It is the responsibility of the contributing MTF to notify patients of the results.

(4) Patient information provided on the glass slide must be consistent with the orders entered into CHCS or printed on the Local PAP smear request form. If inconsistent, Cytology will reject the specimen.

(5) Dependent's PAP smears must be entered with the sponsor's social security number and the dependent's FMP.

(6) Only the Cytology Section at LRMC assigns accession numbers. This permits chronological and sequential numbering for effective control, tracking, and rapid retrieval of cases.

(7) The ORE option 'Orders for PAP smears' will be used by the ordering HCPs to enter orders into CHCS.

(8) After a batch of PAP smears has been ordered in CHCS, use the Lab PAP List (^LPL) option to generate a list of all patients with PAP smears in the batch (shipping document):

(a) **Earliest Order Date: (DDMMMYY)** Format (i.e., 15APR96)

(b) **Latest Order Date: (DDMMMYY)** Format (i.e., 30APR96)

(c) **Select Division:** (i.e., WBG, ABG, SFT, etc.)

(d) **Select Patient:**

(e) **Device Q**

(f) **Device:** Enter name of printer

(g) **Right margin 80//** hit return

(h) The list is formatted as Follows:

ORDER ID# PATIENT NAME FMP/SSN REQ.LOC ABBREV. ___(for # of slides)

(9) Verify that each slide/thin prep vial in the batch has a corresponding patient name, SSN, and FMP on the shipping document. **Reconcile all discrepancies prior to distribution** (i.e., If slides/vials are present for a patient not listed on the shipping document, check to see if orders are in the computer; if not, call the HCP to have them place orders in the computer. Do not send LRMC the slides until the order has been entered into CHCS by the HCP. If a patient is listed, but no corresponding slide/thin prep vial is present in the batch, cross the name off the list and indicate "no slide received". Inform the Health Care Provider that you are missing the slide. If you send unreconciled cases, we will wait 72 hours for you to reconcile the cases before we reject them. We will then mail a completed specimen rejection form back to the HCP explaining the reason for rejection.

(10) If there are multiple slides on a patient, indicate the number of slides on the line provided.

(11) Sign off on the shipping document and record noteworthy comments on rejected specimens or problem cases listed therein. Enclose one copy of the shipping document with the shipment. We maintain these shipping documents for 2 years.

(12) Upon receipt by LRMC Cytology, all slides and corresponding patient data in each batch are verified against the shipping document. If all of the patient information matches, the cytology specimens are accessioned into our COPATH system, which assigns a local specimen number. At this point the cytology specimen will appear in CHCS as "pending" until the diagnosis is certified.

(13) Specimens with unreconciled discrepancies will be rejected and returned to the contributing clinic. It is, therefore, critical that all individuals responsible for submitting PAP smears follow our instructions on proper cytology submission.

e. Compromised Shipments:

(1) Specimen rejections will be noted on rejection forms provided and mailed back to the contributors along with the rejected slides or forms. These rejections will also be noted in the rejection logbook kept in Cytology processing.

(2) Broken slides: We attempt to repair slides that are broken during shipping. However, if we are unable to repair the slides without jeopardizing our safety or without compromising patient care, we will reject the slides.

(3) Thin prep vials that are old: It is critical that thin prep specimens be received in Cytology in a timely manner. Thin prep specimens and subsequent HPV testing can not be performed on specimens that are over 21 days old. These specimens will be rejected.

(4) Request forms and shipping documents: Special care should be taken to prevent contamination from body fluids and preservative chemical spills which might occur during shipment. Separate the specimen and the paperwork by placing them in separate zip-lock bags prior to shipping. If a spill should occur and the paperwork is soiled, we will contact the submitting facility for new paperwork. Unfortunately, processing of the specimens will be delayed.

(5) Incomplete patient information: PAP smears which are improperly labeled [i.e., does not have the patient's full name (Last, First, Middle), FMP & Full SSN, date of birth and name of clinical provider] or PAP smear forms which are incompletely filled out will be rejected. Non-Gyn specimens will be held unprocessed and the HCP notified. The only exception will be spinal fluids which we will process but withhold the diagnosis until the correct information is received.

f. Specimen Handling and/or Collection Instructions.

(1) <u>PAP SMEAR</u>.

(a) Conventional Smear.

Prior to collecting the smear, identify the slide where the specimen will be placed by writing the patient's information on the <u>frosted</u> end of the slide using a #2 or #3 pencil. Cervical: Scrape from complete squamo-columnar junction transition zone by rotating spatula 360 degrees around external os, high up the endocervical canal. Utilize moistened nonabsorbent swab (calcium alginate), endocervical brush, or endocervical aspirate to obtain the endocervical specimen. Place endocervical and ectocervical specimens on one slide (frosted surface up). Spread smear quickly and evenly across slide surface and fix immediately with PAP spray fixative (Cyto-fix, Pro-fix, etc.). For cytohormonal evaluation: a lateral vaginal wall scraping is required. For evaluation of vaginal adenosis: cervix and vagina should be free of mucus before smears are made.

(b) Thin Prep Collection.

[1] WITH ENDOCERVICAL BRUSH/SPATULA.

[a] Obtain ectocervical sample using a plastic spatula

[b] Rinse the spatula as soon as possible in the PreservCyt® Solution vial by swirling the spatula vigorously in the vial 10 times.

[c] Obtain an endocervical sample by inserting an endocervical brush until only the bottommost fibers are exposed. Slowly rotate ¼ or ½ turn in one direction. Do not over rotate.

[d] Rinse the brush as soon as possible in the PreservCyt® Solution vial by rotating it vigorously 10 times while pushing against the vial wall. Swirl the brush further to release the material.

[e] Tighten the cap so that the torque line on the cap passes the torque line on the vial.

[f] Record required information on vial.

[2] WITH BROOM-LIKE DEVICE.

[a] Obtain cervical sample by inserting the central bristles of the broom into the endocervical canal deep enough to allow the shorter bristles to fully contact the ectocervix. Push gently, and rotate broom in a clockwise direction 5 times.

[b] Rinse the broom as soon as possible in the PreservCyt® Solution vial by pushing the broom into the bottom of the vial 10 times, forcing the bristles apart. As a final step, swirl the broom vigorously to further release material.

[c] Tighten the cap so that the torque line on the cap passes the torque line on the vial.

[d] Record required information on vial.

(2) SPINAL FLUID (CSF).

Perform spinal tap and collect a sample in a separate container for cytologic examination. As much volume as possible should be obtained. If other specimens are collected for clinical laboratory analysis (chemistry, cell count, etc.), submit the last tube collected for cytologic analysis. Send the sample IMMEDIATELY to the Cytology laboratory without fixative. Greater than a one-hour delay requires, at a minimum, refrigeration. Longer delays require the addition of an equal volume of Saccomanno's fixative. Even with refrigeration and the addition of preservative, the specimen must still be delivered to the Cytology lab ASAP. Samples taken during non-duty hours should have an equal volume of Saccomanno's fixative added, be refrigerated, and then sent to the Cytology lab the next duty day.

(3) URINE.

(a) Voided urine: Instruct the patient to discard the first morning void and collect any urine that follows for cytologic evaluation in a prelabeled (i.e., full name and Social Security #) urine container. This specimen must be taken to Cytology immediately (less than one hour post voiding). Upon receipt, the specimen will be processed according to the laboratory protocol. If there is a delay for more than an hour, add equal parts of Saccomanno's fixative.

(b) Bladder Washings/Catheterized Urine/Urethral Washings: Following the catheterization or cystoscopy procedure, employ a balanced electrolyte solution (Plasma-Lyte^{R} or equivalent, NOT normal saline). The specimen should be placed in a screw-top container and mixed with an equal volume of Saccomanno's fixative if a delay of greater than one hour is anticipated before reaching Cytology. Label the container as instructed above, place the container in a plastic Ziploc disposable bag, and submit as soon as possible to the Cytology laboratory.

(4) ESOPHAGOSCOPY-ESOPHAGEAL WASHINGS.

During direct esophagoscopy, rinse the lesion with 10-20 mL of a balanced electrolyte solution (Plasma-Lyte^{R} or equivalent BES, NOT normal saline). Aspirate this fluid into a screw-top container. Label the container as instructed above, place the container in a plastic, Ziploc disposable bag, place in ice, and bring specimen directly to the Cytology laboratory. A greater than one hour delay requires the addition of equal volumes of Saccomanno's fixative.

(5) GASTRIC WASHINGS.

Give the patient a soft meal the night before the procedure. The patient may consume water until one hour before the procedure. Pass a number 18 Levin's tube into the stomach, aspirate, and discard gastric fluids. Instill 500 cc of a balanced electrolyte solution (Plasma-Lyte^{R} or equivalent BES, NOT normal saline) using a 100 cc syringe. Have the patient roll onto his right side, back, and left side. In each position, lavage stomach vigorously seven times. Ballot stomach. Empty stomach and place fluid into a screw-top container, label the container as instructed above, place the container in a plastic, Ziploc disposable bag, and place on ice. Deliver the specimen directly to the Cytology laboratory without fixative. A greater than one hour delay requires the addition of an equal volume of Saccomanno's fixative.

(6) BRONCHIAL WASHINGS.

(a) Position the patient so that the bronchus in question is dependent. Fill the bronchus with a balanced electrolyte solution (Plasma-Lyte^{R} or equivalent, NOT normal saline or fluid from the bronchus), place the fluid in a screw-top container, label, and send immediately, without fixative, to the Cytology laboratory. If there is any delay in forwarding specimen to the laboratory, place the fluid in sputum fixative (Saccomanno's).

(b) Specimens submitted for evaluation of infectious diseases MUST remain unfixed and must not have Saccomanno's fixative added until proper processing protocol has been accomplished.

(7) BRONCHIAL BRUSH SPECIMENS.

Quickly smear brush on 2 labeled glass slides. Fix one slide immediately in 95% ethanol and allow the other slide to air-dry without fixative. Submit brush in sputum fixative (Saccomanno's) with the prepared slides to the Cytology laboratory.

(8) POST-BRONCHOSCOPY SPUTUM.

All sputum expectorated after bronchoscopy and for the next hour should be collected in Saccomanno's fixative. Place the bottle in a bag and send the specimen to the Cytology laboratory.

(9) SPUTUM.

(a) The patient should never consume food prior to collection of the sputum sample. Instruct the patient to not drink or gargle the poisonous fixative solution and to keep it away from children. Also keep in mind that saliva is of no diagnostic value and should not be included in the specimen.

(b) **Immediately** after waking from sleep, the patient should rinse his/her mouth out with tap water, cough deeply, and expectorate into a sputum cup pre-filled with Saccomanno's fixative. Any additional sputum from deep coughing after the initial specimen may be included in the sample. For best results, repeat for three consecutive days.

(10) BREAST SPECIMENS.

(a) Nipple discharge: Allow the prepared slides to air-dry and submit these to the Cytology laboratory within 30 minutes of taking specimen. If, however, the slides cannot be submitted within this time frame, spray fix immediately with a PAP smear approved fixative and submit ASAP.

(b) Cyst fluid: Aspirates from the breast should be submitted unfixed to the Cytology laboratory. If collected after normal duty hours, refrigerate and submit the next duty day.

(11) EFFUSIONS (PLEURAL FLUID, ASCITES, SYNOVIAL FLUID).

(a) For best results submit effusions immediately to Cytology without fixation. If you anticipate a delay of more than an hour, refrigerate the specimen. For delays of more than 24 hours, fix with an equal volume of Saccomanno's fixative, refrigerate, and send to Cytology the next duty day.

(b) It is not important for you to send us the entire specimen for processing. Just send us a representative sample. We do, however, need to know the total volume of specimen that was initially collected. Please include this information in the patient history portion of the CHCS order. Place the specimen in a Ziploc bag and send it to Cytology processing.

(12) ASPIRATION BIOPSIES (FNA's).

(a) Appointments must be made the day prior to known FNA procedures. FNAs performed with Cytology personnel assistance should **not** be scheduled after 1500. Adhering to this requirement allows for time to assist with the collection of the FNA and time for subsequent processing of the specimen.

(b) Coordinate the collection of all FNA cases with Cytology by calling 486-8825/6261. When you call, be prepared to give the patient's name, last 4 of the social security number, aspiration site, doctor's name, and the location for the procedure.

(c) Ordering: Since we rush the processing of FNA's, make a special effort to ensure that the doctor places the orders into the computer prior to the procedure. Doing so will prevent processing delays and improve specimen turn-around-times. When ordering, specify the details of the site(s) being aspirated (i.e., first specimen - left thyroid; second specimen - right thyroid; third specimen - right upper quadrant of left breast; etc.).

(d) In emergencies, without the support of the cytotechnologist, smeared slides can be made and allowed to air dry if their delivery is made to Cytology within 30 minutes of collection. Otherwise, these slides must be either submersed in 95% alcohol or, at worst, sprayed with an approved spray fixative. Tissue fragments may be placed in 10% formalin for cell block preparation later.

(e) The best transport media for FNA specimens is Hank's Solution. Please use this solution if you are a local provider. You can initially acquire this from the Cytology Section. The ordering information can be obtained from Cytology.

(13) CONJUNCTIVAL SMEARS FOR TRACHOMA (TRIC).

Submit two (2) smears - Immediately fix one slide in 95% Ethanol and air-dry the other for Diff Quik (or equivalent stain) staining.

(14) BUCCAL SMEARS.

Fix with a spray fixative and submit to Cytology processing.

(15) SPECIMENS NOT COVERED.

All specimens amenable to cytological study will be accepted by Cytology. If you have a case that is not covered in this submission guide, you can call Cytology at the phone numbers below for submission instructions.

g. Points of Contact.

(1) CHCS Mail group: LSL LAB HISTO (accessible by Central European CHCS users only).

(2) Phone Numbers:

(a) Cytology Laboratory.
DSN 486-8825/8909
Civilian: 06371-86-8825/8909

(b) Anatomic Pathology Secretary Numbers.
DSN: 486-7492/7182
Civilian: 06371-86-7492/7182

(3) Mailing Address:

Via US Mail (USPS), Military Postal Service (MPS), or Military Air Lift

Commander
Landstuhl Regional Medical Center
CMR 402
ATTN: MCEUL-P-Cytology
APO AE 09180

Via FedEx and DHL

Commander
US Army Hospital - Landstuhl Regional Medical Center
ATTN: MCEUL-P-Cytology
Gebaude 3711, Zimmer F204
66849 Landstuhl/Kirchberg

h. Notes.

Hazardous Substance Labeling Requirements - Labeling requirements are found in 29 CFR 1910.1200.

Example Standard Form 541 for submission of PAP smears without CHCS access.

MEDICAL RECORD	GYNECOLOGIC CYTOLOGY

SECTION 1 – CLINICAL DATA TO BE COMPLETED BY EXAMINING INSTALLATION

DATE OBTAINED	LMP FIRST DAY	DATE RECEIVED IN LABORATORY
Must Complete	Must Complete	

SOURCE OF SPECIMEN

☐ COMBINED CERVIX AND VAGINA ☐ CERVIX ☐ VAGINA ☐ OTHER (Specify)

Age	PREGNANCY	GRAVIDA	PARA	PREVIOUS ABNORMAL CYTOLOGIC EXAM
	☐ YES ☐ NO	G1	*P1*	*11/99 - LGSIL* ☐ YES (Give date) ☐ NO

CLINICAL HISTORY (Surgery, drugs, hormones, radiation etc.)	PHYSICAL EXAMINATION (Pelvic findings, etc.)
BCP *C-Section 98*	Abn. Colpo Today *ECC/Cx Bx @ 1200 and Pap Done*

SPECIMEN SUBMITTED BY (Facility)	SIGNATURE AND TITLE	SUBMITTING FACILITY ACCESSION NUMBER
Wurzburg GYN/BCBA	*Signature* Dr. Krank, MAJ, US Army	

SECTION II – CYTOLOGIC FINDINGS FROM REPORTING INSTALLATION ONLY

NAME OF LABORATORY	ACCESSION NUMBER

CHECK ONE	YES	NO	CHECK ONE	YES	NO	MATURATION INDEX
Granulocytes			Endocervical Cells			
Leptothrix						PARABASALS
Trichomonas			SCREENED BY			INTERMEDIATES
Candida						SUPERFICIALS

COMMENTS AND RECOMMENDATIONS

PATHOLOGIST'S SIGNATURE	TITLE	DATE

PATIENT'S IDENTIFICATION Full Name, FMP/SSN, DOB	REGISTER NO.	WARD OR CLINIC

CURRENT REFERENCE FACILITY LISTINGS

17. **Armed Forces Institute of Pathology**

a. Non-fatal Aircraft Specimens.

(1) General.

(a) Address: Armed Forces Institute of Pathology
ATTN: Department of Forensic Toxicology
1413 Research Blvd
Rockville, MD 20850-6000

(b) Telephone: (301)319-0100/0012
DSN: 285-0012

(c) Website: **http://www.afip.org/**

(d) The Division of Forensic Toxicology (DFT), Office of the Armed Forces Medical Examiner (OAFME), Armed Forces Institute of Pathology (AFIP), located at the AFIP Annex, Rockville, MD, remains the DoD's centralized laboratory which performs routine toxicological examinations on Class A, B, and C military aircraft, ground, and ship (sea) mishaps in which no fatalities occur. Additionally, OAFME cases include all military aircraft, ground, and ship (sea) accidents involving fatalities; selected military autopsies; biological specimens from AFOSI, CID, and NCIS criminal investigations; blood for legal alcohol (NOTE: legal blood alcohol tests are, as of 1 June 2004, performed within LRMC DPALS' Chemistry section – see Chemistry section of this manual for details) and drug tests in DUI and DWI medico-legal determinations; blood and urine in fitness for duty inquiries; and selected forensic cases of national interest.

(2) Specimens Required for Non-Fatal Aircraft Incidents.

(a) Blood

[1] 7 to 14 mL NaF (gray top tubes)

[2] 7 to 14 mL EDTA (purple top tubes)

[3] 5 to 10 mL Clot (red top tubes)

[4] Do not use Tiger top tubes for blood collection; the serum-separating gel has been shown to absorb certain classes of drugs.

(b) Urine

50 – 70 mL

(3) After collection, hand mix the blood tubes containing an anticoagulant by 5 – 10 gentle inversions and label all specimens with the full name, FMP, and full SSN of the individual from whom you are collecting the specimen.

(4) Shipping procedures.

(a) Each specimen should be individually wrapped in an absorbent packing material and then placed in a heat sealed or zip-lock plastic bag; blood and urine should be packaged separately.

(b) Next, place all specimens and paperwork (paperwork should also be sealed in a separate plastic bag) from a single individual in another heat sealed or zip-lock plastic bag. Do not package different types of specimens together. Do not package more than one set of patient specimens in each bag.

(c) When packaging shipments, do not seal tubes or containers with wax, Parafilm or masking/scotch tape.

(d) The blood and/or urine should be packed UNFROZEN in a shipping container of sturdy cardboard, plastic or metal construction, sealed, and then sent to LRMC, DPALS.

(e) Each individual's set of specimens MUST have an accompanying AFIP Form 1323 and any other documentation pertinent to the case (paperwork should be sealed in a separate plastic bag). Note that failure to submit a properly completed AFIP Form 1323 will delay processing, may result in an incomplete analysis of the submitted specimens, and may cause test results to be returned to the wrong address. AFIP Form 1323 can be downloaded from the website at www.afip.org/oafme/tox/contents.htmL.

(5) The POC (Point-of-Contact) for the submitted case should include their printed name, telephone number, FAX number, and an e-mail address (if applicable) in the appropriate box on the AFIP Form 1323 to facilitate communication concerning "problem" cases.

(6) Please call for information or clarification concerning collection and shipment policies if you are unsure of what to do. It is better to temporarily delay shipment of specimens than to send specimens improperly collected, labeled, packaged, and shipped, or to submit cases without the correct paperwork.

b. Cystic Fibrosis Mutation Testing.

(1) General Information:

The Molecular Diagnostics Laboratory, Dept. of Cellular Pathology and Genetics, Armed Forces Institute of Pathology offers Cystic Fibrosis mutation testing to Department of Defense (DoD) sites. The test detects the panel of 25 mutations recommended by the American College of Medical Genetics (ACMG) and American College of Obstetricians and Gynecologists (ACOG) for Cystic Fibrosis carrier screening.

(2) Physical Address:

AFIP Molecular Diagnostics Laboratory
Dept. of Cellular Pathology and Genetics
Armed Forces Institute of Pathology
Bldg. 101, Rm. 1057
1413 Research Blvd.
Rockville, MD 20850
Telephone: (301) 319-0200
Fax: (301) 295-9507

(3) Laboratory Hours:

Monday through Friday (except Federal holidays) from 0745 to 1630 hours.

(4) Test Description and Methodologies:

(a) Test Name: Cystic Fibrosis Carrier Screen.

(b) Indications: Indications for CF testing are described in the report "Preconception and Prenatal Carrier Screening for Cystic Fibrosis: Clinical and Laboratory Guidelines," published by the ACMG/ACOG Cystic

Fibrosis Steering Committee in October 2001. This report recommends CF screening for (1) Individuals with a family history of CF, (2) Reproductive partners of individuals who have CF, and (3) Couples who are planning a pregnancy or seeking prenatal care. In addition, the test is indicated to help confirm a diagnosis in patients with a clinical presentation suggestive of the disease.

(c) Method: The test is performed by analysis of DNA purified from a blood specimen, and makes use of technologies that permit the detection of 25 mutations recommended for CF carrier screening by the ACMG/ACOG Laboratory Standards Working Group. The initial analysis is performed by the Invader assay using analyte specific reagents manufactured by Third Wave Technologies. Specimens that score as positive by the Invader assay are further analyzed by PCR amplification, followed by hybridization to allele specific oligonucleotides (ASO) to identify the specific mutation present. The PCR amplification and ASO hybridization are performed with CF Gold analyte specific reagents manufactured by Roche.

(d) Sensitivity and Significance of a Negative Result: The following table gives the mutation detection rate of this assay by ethnic group and the residual risk of being a CF carrier after a negative test result:

		Estimated Carrier Risk	
Racial or Ethnic Group	Detection Rate	Before Test	After Negative Test
Ashkenazi Jewish	97%	1/25	~1 in 800
European Caucasian	90%	1/25	~1 in 240
Hispanic American	57%	1/46	~1 in 105
African American	69%	1/65	~1 in 207
Asian American	unknown	1/90	unknown

Source: Richards, C.S., et al. Standards and guidelines for CFTR mutation testing. Genet. Med. 2002:4(5), 379-391

(e) Genetic Counseling: Genetic counselors are health care professionals who can provide information about cystic fibrosis to patients and their families. Counseling is recommended for those who are shown by testing to carry a CF mutation, or for whom there is a family history of cystic fibrosis. Genetic counselors can also provide assistance to health care providers on questions relating to CF carrier screening.

(5) Specimen Requirements.

(a) Preparation of the Patient.

Be sure that the patient has signed an informed consent form for the performance of a genetic test. Verify patient identification. Cleanse the area before collection, inform the patient about the purpose of the blood draw, and assure that the sample is collected in a non-traumatic manner (patient is relaxed). Collect one EDTA (lavender top) vacutainer tube of blood for the CF test. Yellow top (acid citrate dextrose) tubes are also acceptable. Label the blood tube with patient's name, social security or other identification number, and date of draw.

(b) Volume and Storage Requirements.

The minimum acceptable blood volume is 1 mL. Store specimen by refrigeration until shipment. Frozen specimens are unacceptable. If immediate shipping is not possible, specimens may be stored refrigerated (but not frozen) for up to 7 days, such that the time from collection to receipt at AFIP does not exceed 8 days. Ship specimen, cooled with ice or cold packs, in an approved container to the AFIP Molecular Diagnostics Laboratory via an overnight courier.

(6) Test Request Form.

(a) A completed Molecular Diagnostics Laboratory Test Request Form (see Enclosure A) must be received with each specimen sent for CF testing. Enclose the Test Request Form with the shipment. Specimen tube

labels must have at least two identifiers, such as name, SSN, or barcode number. Ensure draw date is legibly annotated on the tube label.

(b) The AFIP Molecular Diagnostics Laboratory reserves the right to reject and discard specimens that do not meet specimen collection and storage requirements; if the documentation or accompanying labels are incomplete, illegible, or mismatched; OR the package does not comply with applicable Federal, State, and international shipping standards. Do not send specimens to arrive on weekends or Federal holidays. The Molecular Diagnostics Laboratory is closed at these times.

(7) Specimen Packaging and Transport.

(a) Sites submitting specimens must comply with the applicable Federal, State and international regulations concerning shipment of infectious and diagnostic substances. We provide the following example as a reference only for minimum requirements:

(b) Following venipuncture, package sample in:

[1] A watertight primary container and a rigid secondary container to help prevent breakage.

[2] Absorbent material, enough to contain spillage.

[3] A shipping package with a biohazard label.

(c) Label container and ship specimens according to applicable guidelines (infectious vs. diagnostic).

(d) All personnel handling specimens for transport should be trained in safe handling practices and in decontamination procedures in case of spillage. Do not send specimens to arrive on weekends or Federal holidays. The laboratory is closed at these times.

(e) If you want AFIP to send your shipping boxes back to your site, you must enclose a pre-filled FedEx or address slip.

(8) Reporting of Results.

(a) The AFIP Molecular Diagnostics Laboratory will test all specimens submitted for CF testing as expeditiously as possible, within the timelines specified in this manual.

(b) The AFIP Molecular Diagnostics Laboratory will, wherever possible, report results directly into the CHCS laboratory information management system. When this reporting mechanism is not available, the Molecular Diagnostics Laboratory will generate hardcopy reports and return them by mail or secured fax line to a designated Point of Contact (POC) for each submitting facility. Due to the sensitive nature of the reports, only this POC (or alternate) can receive the reports. The facility POC then forwards the reports accordingly within that institution. A Designation of Point of Contact form must be completed and submitted to the AFIP Molecular Diagnostics Laboratory by a site desiring to refer specimens before specimens can be shipped to the laboratory for the first time. Use the same form for updates/changes. The Molecular Diagnostics Laboratory cannot change or create POC's without submission of this form.

(9) For information or inquires please contact the following:

Jack H. Lichy, M.D., Ph.D.
Molecular Diagnostics Laboratory Director
301-319-0202; email: lichy@afip.osd

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cystic Fibrosis Prenatal Screen Method: DNA analysis	1 mL of EDTA (lavender top) or ACD (yellow top) anticoagulated blood REFRIGERATE if samples cannot be sent within 24 hours; must be received within 10 days. FROZEN SAMPLES ARE NOT ACCEPTED.	See Report	2 weeks	Samples must be labeled with the date and time drawn, and the patient's name or an identifying number that permits unambiguous identification. A completed Molecular Diagnostics Laboratory Test Request Form must be received with each specimen sent for CF testing.
Cystic Fibrosis Mutation Analysis ***Specimens positive for a mutation on the Cystic Fibrosis Prenatal Screen will be automatically reflexed for a Cystic Fibrosis Mutation Analysis test**				

18. **ARMSTRONG LABORATORY (BROOKS-EPI SURVEILLANCE LABORATORY, LACKLAND AB)**

General Information:

(1) Address: AFIOH/SDE
SDE Receiving
2730 Louis Bauer Dr., Bldg 930
Brooks City-Base, TX 78235-5132

(2) Telephone: (210) 536-8378 Fax: (210) 536-2638
DSN: 240-8378 DSN: 240-2638

(3) e-mail: Cynthia.Osburn@brooks.af.mil

(4) Website: https://kx.afms.mil

(5) Armstrong Laboratory is used primarily for immunology testing. Their Immunology department tests for serological markers of many diseases. To facilitate proper diagnosis, certain assays require simultaneous testing of two specimens collected at least 2 weeks apart; one during the acute phase and one during the convalescent phase of disease. Paired sera that demonstrate at least a fourfold rise in antibody titer or > 30% increase in EIA indices are consistent with sero-conversion in the patient. Inquiries may be directed to DSN 240-8388.

(6) Tests are shipped out to Armstrong Laboratory every Wednesday. DPALS receives results electronically and then transcribes them into CHCS. Total turn-around time is usually two to three weeks.

BROOKS EPI SURVEILLANCE LABORATORY TEST LIST

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Alpha-1-Antitrypsin (AAT) Method: Nephelometry	1 mL nonlipemic serum REFRIGERATED	88-174 mg/dL	Test performed MON, WED, FRI	
Autoantibody Profile Method: IFA	0.2 mL serum REFRIGERATED	< 1:20 titer	Test performed TUES, THUR	Profile includes Anti-Mitochondrial Ab, Anti-Parietal Cell Ab, and Anti-Smooth Muscle Ab
Blastomyces Ab Immunodiffusion	0.3 mL serum	Negative	Test performed Mon, Wed, & Fri	
C3/C4 Complement Profile Method: Nephelometry	1 mL serum FROZEN	C3: 0-2 months: 70-196 mg/dl 2-12 months: 69-201 mg/dl 1-19 years: 70-206 mg/dl adult: 79-152 mg/dl C4: 0-3 months: 13-38 mg/dl 3 months - 19 years: 11-61 mg/dl Adult: 16-38 mg/dl	Test performed MON, THUR	
C3/C4/CH50 Complement Profile Method: Nephelometry (C3/C4) Hemolysis(CH50)	1 mL serum FROZEN	C3: See C3/C4 Profile C4: See C3/C4 Profile CH50 101-300 Units	Test performed TUES, THUR	
Ceruloplasmin Method: Nephelometry	1 mL nonlipemic serum REFRIGERATED	22-58 mg/dL	Test performed MON, WED, FRI	
Complement, Total *See C3/C4 Profile, or C3/C4/CH50 Profile				
Coxiella Burnetti AB *See Rickettsia Ab Profile				

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
ENA Ab Profile Method: Immunodiffusion	0.3 mL serum REFRIGERATED	Negative	Test performed MON, WED, FRI	Profile includes Anti-Jo-1, Anti-PCNA, Anti-RNP, Anti-SCL-70, Anti-Sm, Anti-SSA, and Anti-SSB
Haptoglobin Method: Nephelometry	1 mL nonlipemic serum REFRIGERATED	0-1 month: <5.8-196 mg/dl 1 month–19 years: 22-164 mg/dl Adults: 36-195 mg/dl	Test performed MON, WED, FRI	
Helicobacter Pylori IgG Ab Method: EIA	0.2 mL serum REFRIGERATED	Negative	Test performed MON, FRI	
Hemoglobin Electrophoresis Method: Agarose Electrophoresis	3 mL fresh whole blood, EDTA tube - DO NOT FREEZE Stained peripheral blood smear and 2 mL serum for Ferritin REFRIGERATED	HbF: 0-2.0% HbA: 96.5-100% HbA2: 0-3.5%	Test performed MON-FRI.	Please provide CBC results with RBC morphology and clinical information (race, transfusion history for past four months, and family study). Serum Ferritin is measured as needed per pathologist's request for differential diagnosis of iron deficiency and thalassemia. **Important:** Pathology review may require 1-2 weeks. All information must be included to avoid delays in pathologist's review-report. Whole blood must be free of hemolysis and clots. Will test for Sickle cell and Hemoglobin C, E, S, as requested.
Hepatitis Be AB *See Hepatitis B Surface Antigen				
Hepatitis Be Antigen *See Hepatitis B Surface Antigen				
Hepatitis B Surface Antigen (HBsAg) Method: EIA	1 mL serum	Negative	Test performed daily Mon – Fri	Positive specimens receive follow-up testing for Hepatitis Be Ag; Hepatitis Be Ab; and HBcAb, Total.
Immunoglobulin E (IgE) Method: Chemiluminescent Detection	0.5 mL nonlipemic serum REFRIGERATED	All ages: 1.30-183.0 IU/mL	Test performed Wednesday	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Immunoglobulin Profile (IgA, IgG, IgM) Method: Nephelometry	1 mL nonlipemic serum or CSF REFRIGERATED	IgA: 0-1 month: <7-94 mg/dl 1-12 months: 7-131 mg/dl 1-3 years: 19-220 mg/dl 3-5 years: 48-345 mg/dl 5-10 years: 44-253 mg/dl 10-19 years: 44-441 mg/dl adult: 82-453 mg/dl IgG: 0-3 months: 250-1200 mg/dl 3-24 months: 286-1680 mg/dl 2-4 years: 341-1960 mg/dl 4-19 years: 528-2190 mg/dl adult: 751-1560 mg/dl CSF-Adult 0.48-5.86 mg/dl IgM: 0-2 month: 18.9-193 mg/dl 2-12 months: 21-192 mg/dl 1-4 years: 43-163 mg/dl 4-19 years: 48-226 mg/dl adult: 46-304 mg/dl	Test performed MON, WED, FRI	Profile includes IgA, IgG, IgM levels. IgE to be included in the future.
Mycoplasma pneumoniae Culture	Sputum, throat swab, tissue from surgery. Place in Mycotrans holding media with added antibiotic disc. ROOM TEMPERATURE	Identification	Test performed MON-FRI	Do not refrigerate or freeze organism. Hold and ship at room temperature. Must be placed in Mycotrans media. Call if Mycotrans media is needed.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Renal Stone Analysis Method: FTIR, Chemical Spot Tests	At least a 2 mm x 2mm rinsed and dried specimen. Transport in empty serum tube. REFRIGERATED	Negative	Test performed 3 times a week or more	Compositional analysis of renal stones can provide valuable information regarding possible causes. This test gives the relative percentages of the following in the submitted sample: Calcium Phosphate, Calcium Carbonate, Uric Acid, Cystine, Calcium Oxalate, Calcium Carbapatite, and Ammonium Magnesium Phosphate. Specimens consisting of multiple stones are combined after measurements are taken.
Rickettsia Ab Profile IgM Method: IFA	0.2 mL serum paired sera recommended REFRIGERATED	Coxiella: ?1:16 titer RMSF: ?1:64 titer Typhus: ?1:64 titer	Test performed THURSDAY	Profile includes Coxiella burnetti (Q fever) Ab, RMSF Ab, and Typhus Ab. IgM titers must be interpreted with caution, especially in the absence of IgG. Patients should be further evaluated clinically or serologically, by testing acute and convalescent serum in a parallel to demonstrate a four-fold or greater change in IgM titer.

19. **ARZTLICHES LABOR LATZA (LATZA LABORATORY, ST. INGBERT, GERMANY)**

General Information:

(1) Address: Arztliches Labor
BlucherstraBe 47 A
66386 St. Ingbert Rohrback
Germany

(2) Telephone: 068-949-5500

(3) Only Borrelia IgM and Borrelia IgG tests are referred to this laboratory.

(4) Tests are shipped out on an as needed basis by DHL courier.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Borrelia IgM Method: EIA	CSF only	IgM negative	5 days	Please contact the Central Processing Section (486-7494) when this test is ordered so the pre-analytical phase of testing is managed properly
Borrelia IgG Method: EIA	CSF only	IgG <6 U/mL	5 days	Please contact the Central Processing Section (486-7494) when this test is ordered so the pre-analytical phase of testing is managed properly

20. **BERNHARD-NOCHT INSTITUTE FOR TROPICAL MEDICINE (HAMBURG, GERMANY)**

General Information:

(1) Address: Bernhard-Nocht Institute fur Tropenmedizin
ATTN: Virulogische Diagnostic/Prof. Schmitz
Bernhard-Nocht Str. 74
20359 Hamburg, Germany

(2) Telephone: 040/42818-456 Fax: 040/42818-252

(3) POC: mzd@bni-hamburg.de

(4) This test listing for the Bernhard-Nocht Institute is not comprehensive. If you desire to perform unusual viral serologies or PCR, please contact the Microbiology Section at 486-8812/7832 for assistance.

(5) Website: http://www.bni-hamburg.de/

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Flavi-Virus	1 mL	<1:10	7–10 days	
Rift Valley Virus	1 mL	<1:10	7-10 days	
West-Nile Virus	1 mL	<1:10	7-10 days	

21. **BIOSCIENTIA**

a. General Information:

(1) Address: Bioscientia
Konrad-Adenauer-Strasse 17
55218 Ingelheim, Germany

(2) Telephone: (49) 6132-781-224 or /203 or /165
Fax: (49) 6132 781236

(4) e-mail: int.support@bioscientia.de

(5) Website: http://www.bioscientia.de/englisch/Frame-engl.htm

(6) All information concerning Bioscientia reference laboratory is taken from Bioscientia's Test List, September 2004 Edition.

b. Sampling: General Guidelines.

(1) Take fasting blood samples if possible.

(2) Avoid venous stasis. Dispatch at the earliest opportunity.

(3) For plasma or serum samples take double the amount of whole blood as the volume of plasma or serum specified as the required volume for submission.

(4) Please follow the sampling and shipping directions given in the test list.

(5) Take into account both the possibility of a pharmacological effect of medication on the analytical result as well as a direct interference in the assay.

c. Serum Sampling.

(1) A single use cannula is recommended: Gel formation in the sample can be avoided if Plexiglas or polyethylene collection tubes are used.

(2) Collection: Allow blood to clot for 30 minutes (max. 1 hour) at room temperature.

(3) Centrifuge: (If a centrifuge is not available, draw off serum with a wide gauge needle).

(4) Transfer serum to a Bioscientia mailing tube.

d. Plasma.

(1) The collection tube or syringe must be coated with, or contain, the appropriate anticoagulant.

(2) The following list of containers, which are available from Bioscientia upon request, can be used as collection tubes or syringes can be appropriately coated:

(a) Heparin tubes (100 U/mL blood)

Alternatively: Draw up 1,000 IU heparin (e.g. 0.1 mL Lithium Heparin 5000) before taking 10 mL blood sample.

(b) EDTA tubes (1 mg/mL blood)

Alternatively: Use EDTA tubes commercially supplied for hematological samples, except when otherwise specified.

(c) Citrate tubes (5 mg/mL blood)

Alternatively: Use 1 mL of 3.8% Na Citrate solution (used for coagulation studies) for a 9 mL blood sample. The analytical result should then be divided by a factor of 0.9.

(3) Collecting tubes (or syringes) should be filled with the appropriate amount of blood and then gently but thoroughly mixed (do not shake). Centrifuge immediately.

(4) Transfer plasma to a Bioscientia mailing tube.

e. Whole Blood.

(1) Whole blood is not usually suitable for mailing. The results of many analyses can be drastically altered by hemolysis.

(2) Even though you have previously mailed whole blood samples, follow the sampling directions given in the Test List and use the stabilizers indicated; only then can the sample stability be assured.

(3) If the Test List indicates a whole blood sample is required, use the stabilizing reagent in the quantity indicated.

(4) Draw blood using the anticoagulant indicated.

(5) Transfer to Bioscientia mailing tube.

f. Urine.

(1) Check in the Test List if a single sample or 24-hour sample collection is required.

(2) Give the patient a clean sampling container for a 24-hour collection.

(3) Instruct the patient as follows:

(a) Keep the urine cool during 24-hour collection, i.e. store in the refrigerator, do not keep at room temperature.

(b) Drink normally, but not excessively. No alcohol.

(c) Empty bladder in the morning on waking and discard this urine (except for bacteriology). Note time.

(d) Collection Instructions:

[1] Collect all urine from that time forward. Keep urine cool and protected from light.

[2] The last urine collection takes place on the next morning at the same time noted in (c) directly above.

[3] Measure volume of 24-hour sample and note on the request form.

(4) If the Test List indicates a particular sample pH is required: Thoroughly mix the 24-hour urine sample and take approx. 100 mL of the collected urine and adjust to the appropriate pH using the required acid (e.g., conc. or 1 N hydrochloric acid). Mix well during addition of the acid and test frequently with pH indicator paper to determine when the required pH has been achieved.

(5) Transfer required amount (30 mL) to a Bioscientia urine tube.

(6) Ship specimens as soon as possible.

g. Feces.

(1) Weigh empty collection container or insert a plastic bag.

(2) Avoid inadvertently co-collecting/contaminating the feces with urine or blood during collection of the feces.

(3) Most analyses require a 24-hour collection.

(4) Weigh full collection container.

(5) Note the net weight of sample on the request form.

(6) Mix well and send approx. a 10 g portion in a 30 mL container.

h. 24-Hour Collections.

(1) The best results from a 24-hour collection can only be obtained if the patient receives clear and concise instructions.

(2) Many of the analyses require only an aliquot (portion) (e.g. 30 mL urine, 10 g feces) of the total 24-hour collection.

(3) Do not forget to record the total 24-hour volume or weight on the request form. Observe the sampling and shipping instructions given in the Test List.

i. Frozen Samples.

(1) Obtain appropriate plasma or serum sample. (For renin analyses: chill tube containing sample in an ice bath and maintain cold until the plasma can be processed/separated via refrigerated centrifugation).

(2) Transfer serum/plasma to a Bioscientia mailing tube and freeze immediately.

j. Retained Specimens and Repeat Analyses.

All samples are kept at Bioscientia for two weeks from receipt. Other analyses can be added within this period of time.

BIOSCIENTIA TEST LIST

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
11-Desoxycortisol (Compound S) method: RIA	3 mL heparin plasma, centrifuge immediately Refrigerated	<8.0 ng/mL After Metyrapone stimulation: 80-250 ng/mL	Test performed WED.	
17-Ketosteroid Fractionation method: GC	30 mL of 24 hr urine collection. Please state 24 hr urine volume. Keep cool during collection, but do not freeze. Refrigerated	Aeticholanolone Male: 3.5-5.6 mg/24hr Female: 2.0-4.9 mg/24hr Androsterone Male: 2.1-6.2 mg/24hr Female: 1.8-4.1 mg/24hr Dehydroepiandrosterone (DHEA) Male: <2.3 mg/24hr Female: <1.2 mg/24hr	Test performed once weekly.	Results ready 5 days later.
17-OH-Pregnenolone (S) method: RIA	2 mL serum Refrigerated	Adults: 30-350 ng/100mL Prematures: <3600 ng/100mL Newborn: <829 ng/100mL Children: 1mo-1yr: 36-760 ng/100mL 1yr-15yrs: 15-235 ng/100mL	Test performed every two weeks.	Results ready one week later.
17-OH-Pregnenolone (U) method: RIA	30 mL of 24h urine collection Please state 24h urine volume Refrigerated	95-500 ng/24hr	Test performed every two weeks.	Results ready one week later.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
17-OH-Progesterone method: RIA	1 mL serum Refrigerated	Male: 0.3-3.2 ng/mL Female: follicular phase 0.3 - 1.0 ng/mL luteal phase 0.9 - 4.7 post menopausal 0.04 -1.2 oral contraception 0.02 - 0.9 Children: 1 day old: < 22.3 ng/mL 2 days - 1 month < 22.2 1 month - 12months < 5.1 1 year - 10 years < 1.1 10 years - 20 years < 2.5	Test performed MON & THU.	
18-OH-Corticosterone method: RIA	2 mL plasma or serum	Resting: 12-55 ng/100mL After Exertion: 23-145 ng/100mL After ACTH: <250 ng/100 mL Premature: <670 ng/100mL Newborn: <550 ng/100mL Children: 0-1 year: 5-220 ng/100mL 1-2 years: 18-155 ng/100mL 2-15 years: 6-85 ng/100mL	Test performed once weekly.	
5-HIAA method: HPLC	30 mL of 24 hr urine collection. Put 0.5 mL of 25% hydrochloric acid in the shipping tube, mix well. Do not use acetic acid. Please state 24 hr urine volume Refrigerated	1-7 mg/24hr	Test performed daily.	Synonyms: 5-hydroxy indoleacetic acid (serotonin metabolite)
5-Nucleotidase method: Kinetic UV test	1 mL serum Refrigerated	2 - 10 U/L	Test performed once weekly.	
5-OH-Tryptophan method: LC-MS	2 mL EDTA plasma	<0.01 mg/dL	Performed once weekly.	
Acetone	30 mL Urine	<2.0 mg/L	Performed once weekly. Results ready two days later.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Acetylcholine Receptor Abs method: RIA	2 mL serum Refrigerated	Normal <0.25 nMol/L Borderline: <0.4 nMol/L	Performed TUE & FRI.	
Acetylcholinesterase (A.F.)	20 mL amniotic fluid Refrigerated	See Report	Test performed once weekly.	Test is only performed on request. Please state week of pregnancy.
Acetylcholinesterase (B) Method: Gel-electrophoresis	2 mL heparin blood	0.5-1.0 delta-pH/h	Test performed daily.	
Acid Phosphatase (Prostatic and Total) Method: Naphtalin phosphate	1 mL serum FROZEN	Prostatic: <3.5 U/L Total: Male: <6.6 U/L Female <6.5 U/L	Test performed daily.	
Acinus Cell ABS Method: indirect IF	1 mL serum	<1:10 titer	Test performed once weekly.	
ACTH – Adrenocorticotrophic Hormone (Intact) Method: LIA	1 mL EDTA plasma; centrifuge cool and freeze immediately. SEND FROZEN	9-52 pg/mL	Test performed daily.	
Adenosine Deaminase (enzyme activity)	2-3 mL pleural fluid FROZEN	1.5-3.0 nMol/min/mL	Test performed once monthly.	
Adenovirus Abs Method: CF	1 mL serum Refrigerated	<1:10 titer = abs not detectable 1:10-1:20 titer = abs from previous infection >1:20 titer = fresh infection suspected	Test performed daily.	
Adeno Virus Detection (Adeno virus antigen IFT, adenovirus antigen ELISA, virus culture)	Swab	Negative	Test performed once weekly.	Results ready in two weeks.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
ADH (includes Osmolality) Methods: ADH: RIA Osmolality: cryometric	5 mL EDTA plasma FROZEN	ADH: 1.1 – 4.5 pg/mL Osmolality: 80 – 320 mOsmol/kg	Test performed MON.	
Adrenal Cortex Abs Method: IF	1 mL serum Refrigerated	Not Detectable	Test performed once weekly.	
Afipia felis *See Cat-scratch fever				
Albumin (CSF) Nephelometric	1 mL CSF	< 350 mg/L	Test performed twice weekly.	
Albumin (U)	10 mL urine from a 24-hr collection (quote total volume of urine collected) or urine from the 2nd morning urine	< 20 mg/g Creatinine Creatinine: Female: 280 – 2170 mg/L Male: 390 – 2590 mg/L	Test performed daily.	Infant and children reference values no longer available.
Aldolase UV photometric	2 mL serum	Up to 7.6 U/L	Test performed daily.	
Aldosterone CLIA	2 mL serum or EDTA plasma FROZEN	**For SERUM:** 3-34 ng/dL (upright, sitting – blood drawn 0800 – 1000 hours) 2-19 ng/dL (supine position – blood drawn 0800 – 1000 hours) 2-23 ng/dL (upright, sitting – blood drawn 1600 – 1800 hours) **For EDTA PLASMA:** 3-22 ng/dL (upright, sitting – blood drawn 0800 – 1000 hours) 2-14 ng/dL (supine position – blood drawn 0800 – 1000 hours)	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Alkaline Leukocyte Phosphatase (ALP) Microscopy	2 air dried blood smears from whole blood (NOT EDTA blood) Send immediately.	10-100 Index	Test performed once weekly.	
Alkaline Phosphatase Isoenzymes Electrophoresis	2 mL serum; fasting sample (12 hours) Separate from erythrocytes immediately.	Alkaline Phosphatase, total Female: 35-104 U/L Male: 40-129 U/mL Children: <462 U/L Bone Alkaline Phosphatase Children: >1 year – 64-564 U/L Adults: 11-102 U/L Intestinal Alkaline Phosphatase Adults and Children: w/ blood group O or B: <57 U/L w/ blood group A or AB: <13 U/L Liver Alkaline Phosphatase Adults and Children: 6-74 U/L	Test performed TUE & FRI.	Placenta and tumor Alkaline Phosphatase will be reported if present.
Alpha-1-Antitrypsin Phenotype	2 mL serum	See Report	Test performed once weekly.	Results ready one week later.
Alpha-1-Glycoprotein Method: nephelometric	1 mL serum REFRIGERATE	Adults: 0.5-1.2 g/L	Test performed daily.	
Alpha Amylase (S) (Total) Method: IFCC	1 mL serum REFRIGERATE	28-100 U/L	Test performed daily.	
Alpha Amylase (U) Method: IFCC	10 mL urine	<460 U/L	Test performed daily.	
Alpha Fucosidase	2 mL serum	See Report	Test performed once weekly.	Results ready in approximately 2-3 weeks.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Alpha Galactosidase	10 mL heparin blood Draw sample on day of shipment. Do not send at end of week.	See Report	Test performed once weekly.	Results ready in approximately 2-3 weeks. Due to stability, results cannot always be guaranteed from samples received outside of Germany. Protein analysis and leukocyte preparation will be performed and charged accordingly.
Alpha Glucosidase	10 mL heparin blood Draw sample on day of shipment. Do not send at end of week.	See Report	Test performed once weekly.	Results ready in approximately 2-3 weeks. Due to stability, results cannot always be guaranteed from samples received outside of Germany. Protein analysis and leukocyte preparation will be performed and charged accordingly.
Alprazolam Method: HPLC	2 mL serum REFRIGERATE	2-25 ng/mL	Test performed twice weekly.	
Aluminum (S) Method: AAS.	1 mL serum; use plastic syringe and tube REFRIGERATE	Normal: <10 mcg/L Dialysis patients: <50 mcg/L Overdose suspected: >200 mcg/L	Test performed once weekly.	Results ready within 2 weeks.
Aluminum (U) Method: AAS.	30 mL urine, use plastic container	<30 mcg/L tolerable: <200 mcg/L	Test performed once weekly.	Results ready within 2 weeks.
Amikacin Method: FPIA	1 mL serum	Trough: 5-8 mg/L Peak (after 15 min): 20-30 mg/L Therapeutic range: 15-25 mg/L Toxic: >35 mg/L	Test performed TUE & FRI.	

Amino Acids in Plasma (Quantitative)	2 mL EDTA plasma (NOT heparin plasma). Centrifuge immediately Plasma may be stored at +4°C for no more than 2 days prior to shipping. SEND FROZEN	Reference ranges for specific amino acids listed below. All reference ranges listed below are (in mcMol/L)	Test performed daily. Results ready in one week.	Date of Birth of Patient must be quoted on the request form. The results are age dependent.
Amino Acid Name	**0-1 Month**	**1-24 Months**	**2-18 years**	**Adult**
Phosphoserine	7--47	1--20	1--30	2--14
Taurine	46—492	15—143	10—170	54--210
Phosphoethanolamine	3—27	0—6	0—69	0—40
Aspartic acid	20—129	0—23	1—24	1—25
Hydroxyproline	0—91	0—63	3—45	0—53
Threonine	90—329	24—174	35—226	60—225
Serine	99—395	71—186	69—187	58—181
Asparagine	29—132	21—95	23—112	35--74
Glutamic acid	62-620	10-133	5-150	10-131
Glutamine	376-709	246-1182	254-823	205-756
Sarcosine	0-625	0	0-9	0
Alpha-Aminoadipic acid	0	0	0	0-6
Proline	110-417	52-298	59-369	97-329
Glycine	232-740	81-436	127-341	151-490
Alanine	131-710	143-439	152-547	177-583
Citrulline	10-45	3-35	1-46	12-55
Alpha-Aminobutyric acid	8-24	3-26	4-31	5-41
Valine	86-190	64-294	74-321	119-336
Cystine	17-98	16-84	5-45	5-82
Methionine	10-60	9-42	7-47	10-42
Cystathionine	0-3	0-5	0-3	0-3
Isoleucine	26-91	31-86	22-107	30-108
Leucine	48-160	47-155	49-216	72-201
Tyrosine	55-147	22-108	24-115	34-112
Phenylalanine	38-137	31-75	26-91	35-85
Beta-Alanine	0-10	0-7	0-7	0-12
Gamma-Aminobutyric acid	0-2	0	0	0
Ethanolamine	0-115	0-4	0-7	0-153
Tryptophan	0-60	23-71	0-79	10-140

Amino Acid Name	0-1 Month	1-24 Months	2-18 years	Adult
Hydroxylysine	0-7	0-7	0-2	0
Ornithine	48-211	22-103	10-163	48-195
Lysine	92-325	52-196	48-284	0-390
1-Methylhistidine	0-43	0-44	0-42	72-124
Histidine	30-138	41-101	41-125	0-80
3-Methylhistidine	0-5	0-5	0-5	0
Anserine	0	0	0	0
Carnosine	0-19	0	0	0
Arginine	6-140	12-133	10-140	15-128

Amino Acids in Urine (Quantitative)	30 mL random urine mixed with hydrochloric acid to give a pH value of 4-6. SEND FROZEN.		Samples sent for this test will be assayed for urinary creatinine. This is necessary for correct reference range assignment. All reference ranges listed below are in mcMol/mMol creatinine.		Test performed daily. Results ready in one week.	For this test it is imperative that the patient's date of birth is quoted on the request form. The results are age dependent. If urinary amino acids are detected for which no reference range is given, then the result is to be interpreted as "abnormal" or possibly disease specific.
Amino Acid Name	**0-1Mo**	**1—6Mos**	**6—12 Mos**	**1—2 yrs**	**2-4 yrs**	**4—7 yrs**
Phosphoserine	0	0	0	0	0	0
Taurine	8—226	6—89	9—123	12—159	13—200	17--230
Phosphoethanolamine	0	0	0	0	0	0
Aspartic acid	2—12	2—16	3—12	3—10	2—8	2—8
Hydroxyproline	20—320	0—143	0—22	0—13	0—13	0—13
Threonine	20—138	17—92	14—56	15—62	10—48	9—36
Asparagine	0—84	0—58	0—36	0—32	0—30	0—29
Glutamic acid	0—30	2—29	0—18	0—11	0—10	0—8
Glutamine	52—205	63—229	74—197	62—165	45—236	52—133
Sarcosine	0	0	0	0	0	0
Alpha-Aminoadipic acid	0	0	0	0	0	0
Proline	21—213	0—130	0—14	0—13	0—9	0—9
Glycine	283—1097	210—743	114—445	110—356	111—326	91—246
Alanine	75—244	72—206	36—162	41—130	33—115	27—92
Citrulline	0—11	0—10	0—8	0—7	0—6	0—5
Alpha-Aminobutyric acid	0—9	0—7	0—8	0—8	0—6	0—5
Valine	3—26	4—19	6—19	7—21	6—20	3—15
Cystine	12—39	7—24	6—15	5—13	4—15	4—11
Methionine	7—27	6—22	8—29	7—29	5—21	5—20
Cystathionine	0	0	0	0	0	0
Isoleucine	0—6	0—5	0—6	0—6	0—5	0—5
Leucine	3—25	4—12	4—16	3—17	4—18	3—13
Tyrosine	6—55	12—52	11—54	13—48	10—30	9—35
Phenylalanine	4—32	7—28	11—28	10—31	7—21	6—26
Beta-Alanine	0	0	0	0	0	0
Beta-Aminoisobutyric acid	0—87	0—216	0—226	0—206	0—175	0—59
Gamma-Aminobutyric acid	0	0	0	0	0	0

Amino Acid Name	0-1Mo	1—6Mos	6—12 Mos	1—2 yrs	2-4 yrs	4—7 yrs
Ethanolamine	0	0	0	0	0	0
Tryptophan	0	0	0	0	0	0
Hydroxylysine	0	0	0	0	0	0
Lysine	22—171	15—199	13—79	16—69	10—46	10—68
1-Methylhistidine	0	0	0	0	0	0
Histidine	80—295	72—342	92—278	87—287	68—255	61—216
3-Methylhistidine	20—39	19—40	20—47	22—57	20—59	21—61
Anserine	0	0	0	0	0	0
Carnosine	0	0	0	0	0	0
Arginine	0—14	0—11	0—11	0—8	0—9	0—7

Amino Acids in CSF (Quantitative)	Minimum 1 mL CSF, FROZEN. Sample cannot be used if heavily blood-stained. If only slightly blood-stained, then centrifuge and remark on order form.	All reference ranges listed below are in mcMol/L	Test performed daily. Results ready in one week.	This test should be performed together with a quantitative amino acid analysis in plasma. Send both samples together FROZEN. IMPORTANT: For this test it is imperative that the patient's date of birth is quoted on the request form. Results for those amino acids for which no reference ranges are given are to be interpreted as "abnormal" or disease specific.
Amino Acid Name	**Adult (only)**			
Phosphoserine	0			
Taurine	4.4—12.4			
Phosphoethanolamine	0			
Aspartic acid	0.4—5.2			
Hydroxyproline	0			
Threonine	22.2—52.6			
Serine	18.7—37.5			
Asparagine	<17.9			
Glutamic acid	0			
Glutamine	356—680			
Sarcosine	0			
Alpha-Aminoadipic acid	0			
Proline	0			
Glycine	2.2—14.2			
Alanine	13.4—48.2			
Citrulline	0.8—4.8			
Alpha-Aminobutyric acid	1.5—7.1			
Valine	10.1—37.7			
Cystine	0			
Methionine	<9.3			
Cystathionine	0			
Isoleucine	3.4—13.4			
Leucine	10.4—26.8			

Amino Acid Name	Adult (only)			
Tyrosine	5.3—13.3			
Phenylalanine	6.7—18.3			
Beta-Alanine	0			
Beta-Aminoisobutyric acid	0			
Gamma-Aminobutyric acid	0			
Ethanolamine	0			
Tryptophan	0			
Hydroxylysine	0			
Ornithine	3.0—9.0			
Lysine	20.1—42.9			
1-Methylhistidine	0			
Histidine	11.4—22.2			
3-Methylhistidine	0			
Anserine	0			
Carnosine	0			
Arginine	13.1—35.1			

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Amiodarone & Desethylamiodarone Method: HPLC	2 mL serum	Therapeutic range Amiodarone: 0.7 - 2.5mcg/mL Desethylamiodarone: 0.5 - 2.5 mcg/mL	Test performed MON, WED, & FRI.	These tests are always performed together.
Amitriptyline & Nortriptyline	3 mL serum	Therapeutic range: 80-250 ng/mL	Test setup on TUE & FRI.	Amitriptyline cannot be performed individually. Results ready WED and MON.
Amoebic Abs IHA	1 mL serum REFRIGERATE	<1:32 titer = negative 1:32 – 1:64 titer = borderline, control suggested >1:64 titer = acute or previous amoebiasis, control suggested	Test performed once weekly.	
Amylase Isoenzyme * See Isoamylase				
ANCA-C & ANCA-P (Granulocyte Cytoplasma IgG Abs)	2 mL serum REFRIGERATE	Range for Both: <1:2 titer	Test performed twice weekly.	
Androstenedione Method: CLIA	1 mL serum REFRIGERATE	Female: 0.3-3.3 ng/mL Male: 0.6-3.1 ng/mL **Children**: Female 0-11Mo <1.5 ng/mL 1-10yrs 0.4-0.9 ng/mL 11-14yrs 0.4-1.4 ng/mL 15-17yrs 0.5-3.2 ng/mL Male 0-11Mo 0.3-0.9 ng/mL 1-10yrs 0.4-0.9 ng/mL 11-14yrs 0.6-1.7 ng/mL 15-17yrs 0.7-2.0 ng/mL	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Androsterone Method: GC	30 mL from a 24 hr urine, collect over 5-10 mL acetic acid REFRIGERATE	See Report	Test performed once weekly.	
Angiotensin-1-converting enzyme (ACE) (S) Method: Kinetic, enzymatic test	2 mL serum REFRIGERATE	12-68 U/L	Test performed on M, W, & F.	
Angiotensin-1-converting enzyme (ACE) (CSF) Method: RIA	2 mL CSF REFRIGERATE	< 2 mU/mL Limit of detection: 2.0 mU/mL	Test performed once weekly.	
Anti Calcium Channel Abs (P/Q Type) Method: RIA	1 mL serum REFRIGERATE	Negative	Test performed WED.	
Anti Centromere Abs *See Centromere Abs				
Anti Diuretic Hormone (ADH) *See ADH				
Anti DNASE (Anti Desoxyribonuclease) Method: Nephelometry	1 mL serum REFRIGERATE	Adults: < 200 U/mL	Test performed daily.	(Anti Streptococcal-DNASE B, Anti Streptodornase B, Adnase B) Children reference values are no longer available.
Anti HAV Screening (Hepatitis A Abs) MEIA	1 mL serum	Not detectable	Test performed daily.	To differentiate between an acute and previous Hepatitis A infection, please request IgM specific Hepatitis A (anti HAV IgM specific).
Anti-HU **Method: IF**	1 mL serum REFRIGERATE	Titer <1:100 - negative	Test performed once weekly.	
Anti Platelet Abs (Bound & Free) Method: IF	5 mL EDTA blood and 5 mL serum	For Bound and Free: IgA, IgG and IgM: negative	Test performed once weekly.	Results ready one week later.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Anti Ri Method: IF	1 mL serum REFRIGERATE	Titer <1:100- negative	Test performed once weekly.	
Anti Salivary Gland Abs *See Parotis Abs				
Anti Streptococcal Hyaluronidase (ASH)	1 mL serum or 1 mL puncture fluid	Adults: < 300 U/mL	Test performed twice weekly.	
Anti Thrombin III (Activity) Method: chromogenic substrate	2 mL citrate plasma FROZEN	75-125%	Test performed daily.	Always send a separate sample for this test.
APC Resistance (Activated protein C resistance) Method: Photometric	1 mL citrate plasma FROZEN	> 2.0 ratio	Test performed once weekly.	If the patient is on Coumarin, this should be stopped 7 full days before sample is drawn. If on Heparin, stop 4 full days before. Always send a separate sample for this test.
Apolipoprotein A1 Method: nephelometric	2 mL serum REFRIGERATE	1.1-2.1 g/L	Test performed weekly.	
Apolipoprotein B Method: nephelometric	2 mL serum REFRIGERATE	0.6-1.4 g/L	Test performed weekly.	
Arsenic (B) Method: AAS	10 mL heparin blood REFRIGERATE	<30 mcg/L <100 mcg/L tolerable short-term >50 mcg/L control suggested	Test performed weekly.	
Arsenic (hair) Method: AAS	0.5 g hair	90-180 mcg/100g	Test performed weekly.	
Arsenic (U) Method: AAS	30 mL urine REFRIGERATE	<100 mcg/L	Test performed weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Arylsulphatase A (B) Method: TLC	10 mL heparin blood. Draw sample on day of shipment. Specimen must arrive in lab prior to 1300. Do not send on Friday or weekend.	0.31-1.17 mU/mg	Test performed once weekly. Results ready approx. 2-3 weeks.	Due to stability, results cannot be guaranteed for samples received from outside Germany. Protein analysis and leukocyte preparation will be performed and charged accordingly.
Arylsulphatase A (U) Method: photometric	30 mL urine	41-178 nMol/h/mL 94-288 nMol/h/mg Creat.	Test performed once weekly.	
Ascaris Abs IgG Method: EIA	2 mL serum REFRIGERATE	IgG abs (adults): <10 MONA IgG abs (Larva material): <10 MONA	Test performed once weekly.	
Ascaris Western blot IgG & IgM	2 mL serum REFRIGERATE	Range for both: Negative	Test performed once weekly.	
Aspergillus Fumigatus, Metabolic and Somatic Abs Method: CF	2 mL serum REFRIGERATE	Range for both: < 1:10 titer	Test performed daily.	These tests are always performed together.
Aspergillus IgG Abs Structure Method: EIA	2 mL serum	For all: <25 U/mL	Test performed once weekly.	Detects: Aspergillus clavatus, effusus, flavus, fumigatus, niger, nidulans, repens, terreus, versicolor Tests can be ordered individually.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Avian Precipitant Abs (Specific Abs Type IgG) Method: Western blot	2 mL serum REFRIGERATE	Range for all: Negative	Test performed once weekly.	Includes: Budgerigar droppings, budgerigar feathers, budgerigar serum, canary droppings, canary feathers, canary serum, parakeet droppings, parakeet feathers, parakeet serum, parrot droppings, parrot feathers, parrot serum, pigeon droppings, pigeon feathers, and pigeon serum. * It is imperative you state exactly which specific abs you require, otherwise all will be entered and charged for.
Bartonella *See Cat Scratch Fever				
Basal Membrane Abs (glomerular and tubular) Method: Indirect IF	2 mL serum REFRIGERATE	<1:10 titer	Test performed TUE & THUR.	
Beta 2-Microglobulin (S) Method: MEIA	1 mL serum FROZEN	0.7-1.9 mg/L	Test performed daily.	
Beta 2-Microglobulin (U) Method: MEIA	10 mL urine FROZEN	<170 mcg/L	Test performed daily.	
Beta-2-Transferrin	2 mL nasal fluid and 2mL serum	Negative	Test performed once weekly.	
Beta-Glucosidase Method: TLC	10 mL heparin blood. REFRIGERATE Draw sample on day of shipment, must arrive in lab prior to 1300. Do not send at end of week.	See Report	Test performed once weekly.	Due to stability, results cannot always be guaranteed from samples received from outside Germany. Results ready in approx. 2-3 weeks
Beta-Glucuronidase	2 mL serum	See Report	Test performed once weekly.	Results ready approx. 2-3 weeks.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Beta-Hydroxy-Butyrate Method: HPLC	2 mL serum REFRIGERATE	See Report	Test performed once weekly.	
Bile Acids (total) Method: enzymatic color test	1 mL serum REFRIGERATE	<8.9 µmol/L	Test performed weekly.	
Bilharzia (Schistosoma) Abs Method: Hemagglutination	1 mL serum REFRIGERATE	<1:16 = abs not detectable 1:16-1:32 = borderline >1:32 abs detectable	Test performed once weekly.	
Bilirubin (Delta) (AF) Method: Photometric	5 mL amniotic fluid FROZEN (Light sensitive, wrap in foil and transport FROZEN)	See Report	Test performed daily.	
Biotinidase, quantitative Method: enzymatic	2 mL serum FROZEN	4.2-12.8 nmol/mL/min	Test performed once weekly.	Always send a separate sample for this test.
Bordetella Pertussis Abs (whooping cough) IgA, IgG, and IgM Method: EIA	1 mL serum REFRIGERATE	IgA <15 U/mL - abs not detectable 15-22 U/mL – borderline >22 U/mL – abs detectable IgG <20 U/mL- abs not detectable 20-30 U/mL – borderline >30 U/mL – abs detectable IgM <9 U/mL- abs not detectable 9-14 U/mL – borderline >30 U/mL – abs detectable	Test performed TUE & FRI.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
BRCA 1/2 Analysis	2 – 10 mL EDTA blood samples (i.e., a total of 20 mL EDTA blood is required if both gene analyses are to be performed; alternatively draw 4 – 7 mL EDTA blood tubes) Store and ship EDTA blood tubes at room temperature – must arrive at Bioscientia within 3 days of drawing the blood.	See Report	4 – 6 weeks	An informed consent and a completed family history questionnaire must be submitted with the EDTA blood specimens. Contact Central Processing for the forms or, alternatively, the forms can be downloaded from the Bioscientia Web site.
Budgerigar Fanciers Disease *See Avian Precipitant Abs				
C-Peptide Method: CLIA	1 mL serum FROZEN	0.8-3.9 ng/mL (after 12hrs fasting) After glucose loading, 3-5 times more than basal value.	Test performed daily.	
C1 Esterase Decay (Activity/Function) Method: coagulation chromo gen	2 mL citrate plasma FROZEN	0.70-1.30 U/mL (corresponds to 70%-130%)	Test performed FRI.	
C1 Esterase Inhibitor (protein) Method: nephelometric	1 mL citrate plasma REFRIGERATE	0.15-0.35 g/L	Test performed daily.	
C1Q Complement Component Method: nephelometric	2 mL serum REFRIGERATE	100-250 mg/L	Test performed once weekly.	
C2 Complement component Method: RID	1 mL serum REFRIGERATE	80%-120%	Test performed once weekly.	
C3D Complement Component Method: EIA	1 mL serum FROZEN	<20%	Test performed once weekly.	Always send a separate sample for this test.
C5 Complement Component Method: RID	1 mL serum REFRIGERATE	80%-120%	Test performed once weekly.	
C8 Complement Component Method: RID	1 mL serum REFRIGERATE	80%-120%	Test performed once weekly.	
C9 Complement Component Method: RID	1 mL serum REFRIGERATE	80%-120%	Test performed once weekly.	
CA 125 (Tumor Marker) Method: MEIA	1 mL serum REFRIGERATE	<35 U/mL non-specific values: <65 U/mL	Test performed daily.	
CA 15-3 (Tumor Marker) Method: MEIA	1 mL serum REFRIGERATE	<28 U/mL	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
CA 19-9 (Tumor Marker) **Method: LIA**	1 mL serum REFRIGERATE	< 37 U/mL	Test performed daily.	
CA 50 (Tumor Marker) Method: RIA	1 mL serum REFRIGERATE	<25 U/mL (in 95% of all cases)	Test performed on TUE & FRI.	
Cadmium (B) Method: AAS	5 mL heparin blood REFRIGERATE	Smokers: up to 0.06 µmol/L Non-smokers: up to 0.03 µmol/L	Test performed weekly.	Results ready within two weeks.
Cadmium (U) Method: AAS	10 mL Urine REFRIGERATE	Smokers and Non smokers: <2 mcg/L Tolerable: < 15 mcg/L	Test performed weekly.	Results ready within two weeks.
Calcitonin Method: LIA	1 mL serum FROZEN	Female: <4.6 pg/mL Male: <11.5 pg/mL	Test performed M, W, F	
Campylobacter ABS (Jejuni & Intestinalis)	1 mL serum	Ref. Range for both: <1:10 titer – abs not detectable 1:10-1:20 titer – borderline or abs from previous infection >1:20 titer – abs detectable	Test performed daily except MON.	
Canary Fanciers disease *See Avian Precipitant Abs				
Candida Abs (IgA, IgG, IgM) Method: EIA	2 mL serum REFRIGERATE	IgA <60 U/mL = not detectable 60-80 U/mL = borderline >80 U/mL = abs detectable IgG <40 U/mL = not detectable 40-100 U/mL = borderline >100 U/mL = abs detectable IgM <60 U/mL = not detectable 60-80 U/mL = borderline >80 U/mL = abs detectable	Test performed M,W,F.	
Carbohydrate Deficient Transferrin (CDT) Method: Ion exchange with turbidimetric immunoassay	1 mL serum REFRIGERATE	2.5% borderline up to 3.0%	Test performed daily.	
Cardiolipin Antibodies (IgG & IgM) Method: ELISA	1 mL serum	For Both: <12 U/mL	Test performed twice weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Carnitine, Free (S) Method: REA	1 mL serum Freeze immediately, send FROZEN	**Female**: 1-7 days 10.1-36.0 mcmol/L 8-28 days 12.3-46.2 mcmol/L 29 days-1yr 26.9-49.0 mcmol/L 1-17yrs 21.6-66.4 mcmol/L >18yrs 20.0-47.0 mcmol/L **Male**: 1-7 days 10.1-36.0 mcmol/L 8-28 days 12.3-46.2 mcmol/L 29 days-1yr 26.9-49.0 mcmol/L 1-17yrs 21.6-66.4 mcmol/L >18yrs 20.0-59.0 mcmol/L	Test performed TUE.	Whenever this test is requested it is vital that the patient's date of birth is quoted on the request form. See also Acylcarnitine structure.
Carnitine, Total (S) Method: REA	2 mL serum Freeze immediately, send FROZEN	**Female**: 1 day 23.3-67.9 mcmol/L 2-28 days 17.4-58.7 mcmol/L 29 days-1yr 38.1-68.0 mcmol/L 1-10yrs 27.8-83.6 mcmol/L 10-17yrs 33.7-77.5 mcmol/L >18yrs 29.0-61.0 mcmol/L **Male**: 1 day 23.3-67.9 mcmol/L 2-28 days 17.4-58.7 mcmol/L 29 days-1yr 38.1-68.0 mcmol/L 1-10yrs 27.8-83.6 mcmol/L 10-17yrs 33.7-77.5 mcmol/L >18yrs 33.0-72.0 mcmol/L	Test performed TUE.	Whenever this test is requested it is vital that the patient's date of birth is quoted on the request form. See also Acylcarnitine structure.
Carotene Method: HPLC	1 mL serum REFRIGERATE (Protect from light. Wrap tube in aluminum foil).	150-1200 ng/mL	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cat Scratch Fever Method: IF	2-3 mL Serum REFRIGERATE	Bartonella henselae IgG < 1:64 titer - not detectable 1: 64-1:128 - borderline, control recommended ?1: 256 - acute or past infection, control recommended Bartonella henselae IgM < 1:20 titer - not detectable ? 1:20 titer - detectable Bartonella quintana IgG < 1:64 titer - not detectable 1:64 - 1:128 - borderline, control recommended ?1:256 - acute or past infection, control recommended Bartonella quintana IgM (EIA) < 1:20 titer - not detectable ? 1:20 titer - detectable	Test performed once weekly.	These are always performed together.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Catecholamines (P) (Adrenaline, Noradrenaline, and Dopamine) Method: HPLC	2 mL EGTA-Glutathione plasma (NOT EDTA plasma). Request special tubes and state for this test as otherwise it can be confused with Vitamin C tube requirement. FROZEN How to obtain a sample: 1. The blood should be drawn from the patient (who is lying down) approx. 30 min. after a canule has been positioned. 2. Put 5 mL of whole blood in the catecholamine tube (EGTA tube), mix by tipping to and fro carefully and cool immediately (do not freeze yet). 3. Centrifuge cool to obtain plasma. Put the plasma into a normal Bioscientia tube, write on the form that specimen is EGTA plasma, add patient data, freeze and send FROZEN.	Adrenaline: <125 ng/L Noradrenaline: <450 ng/L Dopamine: <85 ng/L	Test performed daily.	These tests are always performed together.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Catecholamines (U) (Total) (Adrenaline, Noradrenaline and Dopamine) Method: HPLC with electro-chemical detector	2x30 mL of a 24 hr urine collection. REFRIGERATE Immediately after collection, mix the 24 hr. urine well. Please state 24 hr. urine volume. Prepare the shipping tube to contain 0.5 mL of 25% hydrochloric acid, fill tube with urine and mix well. Ensure pH value between 2-4. Do not use acetic acid or boric acid.	Adrenaline: Adults: < 20 mcg/24hr 0-1 year: < 3 mcg/24hr 1-2 years: < 4 mcg/24hr 2-4 years: < 6 mcg/24hr 4-10 years: < 10 mcg/24hr 4-15 years: ---------- Noradrenaline: Adults: <80 mcg/24hr 0-1 year: < 10 mcg/24/hr 1-2 years: < 17 mcg/24hr 2-4 years: < 29 mcg/24hr 4-10 years : < 65 mcg/24hr 4-15 years: ---------- Dopamine: Adults: <480 mcg/24hr 0-1 year: < 85 mcg/24hr 1-2 years: <140 mcg/24hr 2-4 years: < 260 mcg/24hr 4-10 years:---------- 4-15 years: < 400 mcg/24hr	Test performed daily.	Diet: It is recommended that the patient has no intake for 2 days prior to collection of the urine sample of the following: nuts, citrus fruits, cocoa, coffee, or vanilla containing products. Medication: If clinical condition allows, it is also recommended that the patient stops taking catecholamines, MAO inhibitors or catecholamine reuptake inhibitors at least 2 days prior to sampling. These tests are always performed together; Dopamine is no longer offered singularly. For all tests at least 2 urine tubes are required. Metanephrines, VMA, and Homovanillic Acid can also be performed on the specimen.
CD4, CD8 *See T4, T8 Lymphocytes				
CDT *See Carbohydrate Deficient Transferrin				
Centromere Abs Method: Indirect IF	2 mL serum REFRIGERATE	< 1:80 titer	Test performed once weekly.	
Chlamydia Pneumonia IgA & IgG ABS Method: EIA	1 mL serum REFRIGERATE	Reference range for both: <10 R.U/mL (abs not detectable)	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Chlamydia Psittaci IgG & IgM ABS Method: MIF	2 mL serum REFRIGERATE	IgG: <1:64 titer – abs not detectable IgM: <1:20 titer – abs not detectable	Test performed once weekly.	These tests are always performed together.
Chlamydia Trachomatis DNA (NAT) PCR Method: PCR	Special swab (request special swab) or 20 mL first void urine sent cool or FROZEN.	Negative	Test performed twice weekly.	
Chlamydia Trachomatis IgA & IgG ABS Method: EIA	2 mL serum REFRIGERATE	Reference range for both: <1.0 index: abs not detectable 1.0 – 1.1 index: borderline >1.1 index: abs detectable	Test performed daily.	
Chloride (CSF) Method: I.S.E. indirect	1 mL CSF REFRIGERATE	CSF: 120-132 mMol/L	Test performed daily.	
Chloride (U)	10 mL of a 24 hr. urine. Please state volume of 24 hr. urine. REFRIGERATE	170-250 mMol/24 hr.	Test performed daily.	
Chloropropamide *See Sulfonylurea structure				
Chloroquine	2 mL serum	Therapeutic range: 20 – 200 mcg/L Toxic: > 1.000 mcg/L	Test performed once weekly.	
Cholinesterase (Pseudocholinesterase) Method: butyrylthiocholin	2 - 3 mL serum. REFRIGERATE	Female: 4.3-11.3 kU/L Male: 5.3-12.9 kU/L Children: 5.3-12.9 kU/L	Test performed daily.	
Chromium (S) Method: AAS	5 mL serum REFRIGERATE	<1 mcg/L	Test performed weekly.	Results ready within two weeks.
Chromium (U) Method: AAS	30 mL urine	<3 mcg/L tolerable: <25 mcg/L	Test performed weekly.	Results ready within two weeks.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Chromogranin A Method: IRMA	1 mL serum FROZEN	< 110 mcg/L	Test performed MON & TH.	Increased results are found in different neuroendocrine active tumors such as phaeochromocytomes, carcinoids, c-cell carcinomas, islet cell tumors, tumors of the anterior pituitary gland, small-cell bronchial carcinomas. Please note when interpreting the result that false-increased values are possible (up to 2000 mcg/L) in cases of renal deficiency depending on the grade of renal damage.
Chromosome Analysis (AF, B) *See Cytogenetic Testing				
Chymotrypsin Method: photometric	2-3 g feces, well mixed sample. REFRIGERATE	>6 U/g Borderline: 3-6 U/g	Test performed daily.	Stop all medication two-three days before collecting sample.
Ciclosporine Method: FPIA	2 mL heparin or EDTA blood. Draw on day of shipment. DO NOT FREEZE. Quote sampling date. REFRIGERATE	After transplantation: <3rd month: 150-350 ng/mL Support therapy: 80-150 ng/mL Depending on transplant other therapeutic ranges are mentioned in the literature.	Test performed daily.	
Circulating Immunocomplexes Method: ELISA	3 mL serum FROZEN Sampling conditions have been changed: Please allow the blood sample to clot for 2 hours at room temperature; please send FROZEN serum. Always send a separate sample for this test.	C1Q – Circulating Immunocomplex < 35 mcg/HAG/mL C3d – Circulating Immunocomplex <8 mcg/HAG/mL 8-15 mcg/HAG/mL - borderline	Test performed once weekly.	HAG = Heat Aggregated IgG
Citrate	2 mL EDTA blood or 2 mL serum REFRIGERATE	See Report	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Citrate (Sperm) Method: Enzymatic UV test	1 mL sperm FROZEN	250-800 mg/dL	Test performed once weekly.	
Citrate (U) Method: GC-MS	10 mL of a 24 hr. urine, quote total volume of collection REFRIGERATE	140-940 mg/24 hour	Test performed once weekly.	
Clomipramine & Desmethylclomipramine Method: HPLC	3 mL serum REFRIGERATE	Therapeutic: Clomipramine: 70-200 ng/mL Desmethylclomipramine: 150 - 300 ng/mL Toxic for both: > 500 ng/mL	Test performed twice weekly.	
Cobalt Method: AAS	30 mL urine REFRIGERATE	<2 mcg/L	Test performed twice weekly.	Results ready within two weeks.
Collagen Abs Profile (Types I-VII) Method: Elisa/IF	3 mL serum REFRIGERATE	Range for all: Negative	Test performed once weekly.	These tests cannot be requested individually.
Copper (S) Method: AAS	3 mL serum REFRIGERATE	Male: 70-140 mcg/dL Female: 85-155 mcg/dL Patients on contraceptive treatment: >200 mcg/dL	Test performed M, W, & F.	
Copper (U) Method: AAS	30 mL of 24 hr. urine collection with 10 mL hydrochloric acid. Please state volume of 24 hr. urine REFRIGERATE	Adults: < 50 mcg/24 hr. Values > 100mcg/24 hr. are significantly raised	Test performed twice weekly.	
Coproporphyrins (F) *See Porphyrins (F)				
Coproporphyrins (U) *See Porphyrins (U)				
Cortisol (S) Method: LIA	1 mL serum REFRIGERATE	Morning: 4.3-22.0 mcg/dL Evenings: one third of the morning value After oral contraceptive: < 39 mcg/dL	Test performed daily.	Children's reference ranges available on request.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cortisol, Free (U) Method: LIA with extraction	10 mL of a 24hr. urine. Use our boric acid tubes. Please state 24 hr. urine volume. REFRIGERATE	12-104 µl/24 hr.	Test performed MON & THUR.	
Coxiella Burnetti *See Q-Fever				
Coxsackie B1-B6 & A9 Method: CF	2 mL serum REFRIGERATE	< 1:10 titer	Test performed daily.	These tests can be requested individually.
Creatine (S) Method: Enzymatic	1 mL serum REFRIGERATE	Children: 0.5-1.1 mg/dL Adults: 0.3-0.7 mg/dL	Test performed once weekly.	
Creatine (U) Method: Enzymatic	30 mL of a 24-hr. urine, quote volume of 24-hr urine collection REFRIGERATE	Male: 11-189 mg/24h Female: 19-270 mg/24h	Test performed once weekly.	
Creatine Kinase Isoenzymes (CK-MM, CK-BB, CK-MB) Method: Electrophoresis	2 mL serum FROZEN	CKMM: 95-100% of CK CKMB: 0-5% U/L CKBB: not detectable	Test performed weekly.	
Cryoglobulin, Qualitative Method: cold precipitation	5 mL serum DO NOT FREEZE or REFRIGERATE. Allow blood to clot at 37C. Centrifuge warm.	Not Detectable	Test performed daily.	
Cyanide Structure Method: photometric	2 mL EDTA blood REFRIGERATE	Cyanide: < 50 mcg/L Thiocyanate: Non-smokers: < 4.6 mg/L Therapeutic range: 5.0-30.0 mg/L Toxic >50.0 mg/L (under Nitroprusside-sodium therapy)	Test performed once weekly.	These tests are always performed together.
Cyclosporin *See Ciclosporine				
Cysticercosis IgG ABS Method: EIT	2 mL serum REFRIGERATE	< 6 MONA	Test performed once weekly	
Cystine, Photometric (U)	30 mL of 24 hr urine. Mix the urine specimen with approx. 0.5 mL acetic acid or hydrochloric acid, mix well and adjust to pH 2-3 (no more than 3). Please state 24h urine volume. REFRIGERATE	10-100 mg/24 hr.	Test performed on TUESDAY.	

Cytogenetic Test	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cytogenetic Testing Please note for all Cytogenetic analyses: Draw on day of shipment. Send immediately. Turn-a-around time is dependent on the culture. Please note that listed turn-around-time starts on arrival of specimen in our lab. If no sampling date quoted on form or tube or if specimen too old, analysis will not be performed. It is imperative that clinical data is always quoted.				
Chromosome Analysis (prenatal)				
Amniotic Fluid Alpha-fetoprotein (AFP)			Test performed daily.	Only in combination with Amniotic Fluid Chromosome Analysis, see below. AFP results are reported separately as soon as complete. Results ready in 1-2 days.
Amniotic Fluid Acetylcholinesterase (ACHE)			Test performed daily.	Only in combination with Amniotic Fluid Chromosome Analysis, see below. ACHE results are reported separately as soon as complete. Results ready in 4 days.
Amniotic Fluid Chromosome Analysis	15 mL amniotic fluid Discard the first 2 mL collected, store and send at ROOM TEMPERATURE, never centrifuge!		Test performed daily.	See also AFP, ACHE, Fluorescence in situ Hybridization (FISH) Results ready in 8 days.
Chorionic Villi Sampling (CVS) Chromosome Analysis	At least 10-20 mg chorionic villi in a sterile medium for transport (tubes are supplied by our lab on request) REFRIGERATE Alternatively use sterile-coated tube with physiological NaCl and antibiotics: Penicillin/Streptomycin (100 IU/100 µg/mL) or Gentamicin (50 µg/mL)		Test performed daily.	Results ready: Direct preparation: 2 days (preliminary report) Culture: 7 days (final report).
Percutaneous Umbilical Blood, Fetal Blood (PUBS) Chromosome Analysis	2.7 mL heparin monovettes tube REFRIGERATE		Test performed daily.	An additional Kleihauer-Betke test is performed (f.o.c.) Results ready in 4 days.

Cytogenetic Test	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Products of Conception (POC) Chromosome Analysis	If possible, add chorionic villi and send in sterile medium for transport (tubes are supplied by our lab on request) Alternatively: use sterile-coated tube with physiological NaCl and antibiotics: Penicillin/Streptomycin (100 IU/100 µg/mL) or Gentamicin (50 µg/mL) REFRIGERATE DO NOT send in Formalin		Test performed daily.	Results ready in 10 days.
Chromosome Analysis (post natal)				
Peripheral Blood Routine Chromosome Analysis	Heparin monovettes tubes: Adults: 5-7.5 mL blood Children: 5-7.5 mL blood Newborns: 1-2.7 mL blood REFRIGERATE		Test performed daily.	Same specimen requirements also apply for High Resolution Chromosome Analysis (Prometaphase) and for Mosaicism Chromosome Study. Results ready in 9 days. In urgent cases 3-5 days.
Skin Biopsy Chromosome Analysis	Approx. 5 mg/2-10 mm^2 of tissue in sterile medium for transport (tubes are supplied by our lab on request) Alternatively: use sterile-coated tube with physiological NaCl and antibiotics: Penicillin/Streptomycin (100 IU/100 µg/mL) or Gentamicin (50 µg/mL) REFRIGERATE DO NOT send in formalin.		Test performed daily.	Same requirements also apply for Skin Biopsy Mosaicism Study (Mosaic Chromosome Study). Results ready in 9 days.
Solid Tumor/Ascites Chromosome Analysis (on request ONLY)				

Cytogenetic Test	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Bone Marrow Chromosome Analysis (e.g. Philadelphia chromosome)	7.5 mL heparin monovettes tube REFRIGERATE		Test performed on request only.	Results ready in 7 days.
Leukemic Blood Chromosome Analysis (e.g. Philadelphia chromo some)	7.5 mL heparin monovettes tube REFRIGERATE		Test performed on request only.	Results ready in 7 days
Molecular Cytogenetics/Fluorescence in situ Hybridization (FISH)	A list of the Probes used for FISH is available on request.			
Fluorescence in situ Hybridization (FISH): e.g. Microdeletion Analysis	This analysis (FISH) can be performed in all specimens, heparin blood, amniotic fluid, skin biopsy, chorionic villi (as well as on fixed cell suspensions).		Test performed daily.	Analysis is only possible together with a conventional chromosome analysis. If another laboratory has already performed this send us the report and documentation with the specimen. Please note that if Microdeletion analysis is requested a Prometaphase analysis must also be performed. Results ready in 8 days.
Interphase FISH/Prenatal Rapid Aneuploidy Screening	Approx. 20 mL amniotic fluid (test is not possible if specimen is bloody)		Test performed daily.	Analysis only possible together with a conventional prenatal Chromosome analysis (not possible if specimen is bloody). Results ready: Interphase FISH: 2 days (preliminary report) Culture: 8 days (final report)
Biochemistry				
Amniotic Fluid Alpha-fetoprotein (AFP) *See Chromosome analysis (prenatal)				
Amniotic Fluid Acetylcholinesterase (ACHE) *See Chromosome Analysis (Prenatal)				

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Cytomegalovirus (PCR) Method: PCR	7 mL of EDTA blood – use Bioscientia tubes only REFRIGERATE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	Negative	Test performed once weekly.	Also performable on 20 mL urine, 2 mL CSF, amniotic fluid or sputum.
DALA/DELTA Aminolaevulinic acid Method: column chromatography with photometric detection	30 mL of a 24 hr. urine. During collection keep cool and protect from light. Please state 24 hr. urine volume. REFRIGERATE	Adults: <7 mg/24 hr.	Test performed on WED.	Porphyrins and Porphobilinogen can also be performed in this sample.
Dehydroepiandrosterone Sulphate *See DHEA -S				
Dengue Virus Abs, IgG & IgM ELISA	1 mL serum	IgG: < 1 Index – abs not detectable IgM: negative	Test performed once weekly.	Note: These tests are always performed together.
Desipramine (Norpramine) Method: HPLC	3 mL serum REFRIGERATE	Therapeutic Range: 75-300 ng/mL	Test performed on TUE & FRI.	Results are ready Wednesdays and Mondays
Dexamethasone Level Method: HPLC	1 mL serum REFRIGERATE	5-50 ng/mL	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
DHEA-S (Dehydroepiandosterone Sulphate) Method: LIA	2-3 mL serum REFRIGERATE	Male: 80-560 µg/dL Female: 35-430 µg/dL Post menopausal: up to 190 µ/dL **Reference range for children**: **Female**: 1-7 days: 69-472 µg/dL 8-15 days: 33-350 µg/dL 16 days – 3 years: <123 µg/dL 4-6 years: <47 µg/dL 7-8 years: 10-79 µg/dL 9-10 years: 12-195 µg/dL 11 years: 8-100 µg/dL 12 years: 24-226 µg/dL 13 years: 21-170 µg/dL 14 years: 22-327 µg/dL 15 years: 32-351 µg/dL 16 years: 56-385 µg/dL 17 years: 85-405 µg/dL 18-19 years: 142-437 µg/dL Tanner 1: 16-97 µg/dL Tanner 2: 22-185 µg/dL Tanner 3: 10-297 µg/dL Tanner 4: 16-343 µg/dL Tanner 5: 57-396 µg/dL 20-29 years: 65-380 µg/dL 30-39 years: 45-270 µg/dL 40-49 years: 32-240 µg/dL 50-59 years: 26-200 µg/dL 60-69 years: 13-130 µg/dL 70-79 years: 17-90 µg/dL **Males: SEE NEXT PAGE**	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
DHEA-S (Dehydroepiandosterone Sulphate) (continued from previous page)		**Male**: 1-7 days: 85-423 µg/dL 8-15 days: 30-176 µg/dL 16 days – 3 years: <99 µg/dL 4-6 years: <228 µg/dL 7-8 years: 7-119 µg/dL 9-10 years: 14-89 µg/dL 11 years: 19-192 µg/dL 12 years: 11-374 µg/dL 13 years: 13-289 µg/dL 14 years: 14-300 µg/dL 15 years: 52-441 µg/dL 16 years: 30-365µg/dL 17 years: 99-345 µg/dL 18-19 years 103-475 µg/dL Tanner 1: 11-120 µg/dL Tanner 2 14-438 µg/dL Tanner 3: 5-312 µg/dL Tanner 4: 29-413 µg/dL Tanner 5: 103-468 µg/dL 20-29 years: 280-640 µg/dL 30-39 years: 120-520 µg/dL 40-49 years: 95-530 µg/dL 50-59 years: 70-310 µg/dL 60-69 years: 42-290 µg/dL 70-79 years: 28-175 µg/dL		
Dibucaine Inhibition of the Pseudocholinesterase Method: kinematic test	2 – 3 mL serum REFRIGERATE	Normal: >70% Intermediary: 30 - 70% Atypical: <30%	Test performed once weekly.	See also cholinesterase and Fluoride Inhibiting pseudocholinesterase

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Dihydrotestosterone Method: HPLC	2 mL heparin plasma FROZEN	**Female**: 3-23 ng/dL Premature: <13 ng/dL Newborn:<15 ng/dL Children: 1 month - 9 years: 2-10 ng/dL 10-17 years: 2-23 ng/dL **Male**: 25-65 ng/dL Premature: <55 ng/dL Newborn: <60 ng/dL Children: 1 month - 6 months: 2-60 ng/dL 6 months - 9 years: 2-10 ng/dL 10 - 16 years: 3-65 ng/dL	Test performed every two weeks.	
Diphenylhydantoin (Phenytoin, Dilantin) Method: FPIA	1 mL serum (0.3 mL sufficient for pediatric sample). Draw 1.5-3 hours after last oral dose. REFRIGERATE	Therapeutic range: 0-3 months: 6-14 µg/mL >3 months and adults: 10-20 µg/mL	Test performed daily.	Synonyms: Free Dilantin, Free DPH, Free Phenytoin
Diphtheria Abs Method: EIA	1 mL serum REFRIGERATE	<0.1 IU/mL – Immunization recommended .1-1.0 IU/mL - booster required 1.0-1.4 IU/mL - booster after 5 years 1.5-2.0 IU/mL - booster after 7 years > 2.0 IU/mL - booster after 10 years	Test performed daily.	
Disopyramide Method: FPIA	2 mL serum REFRIGERATE	Therapeutic Range: 2-5 µg/mL Toxic: >7 µg/mL	Test performed TUE & FRI.	
Diuretic Screen (Includes canrenone, furosemide, hydrochlorothiazide, mefruside, piretanide & xipamide) Method: GC-MS	30 mL urine REFRIGERATE	Negative	Test performed once weekly.	Results ready one week later.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
DNA ABS (Double Strand) IgG Method: ELISA	1 mL serum REFRIGERATE	<100 IU/mL	Test performed three times weekly.	
DNA ABS (Single Strand) Method: ELISA	1 mL serum REFRIGERATE	< 20 RU/mL	Test performed twice weekly.	
Dopamine *See Catecholamines				
Doxepine & Desmethyldoxepine	3 mL serum REFRIGERATE	Therapeutic Range: 150-250 ng/mL	Test performed TUE & FRI.	Results are ready Wednesdays and Mondays. These tests are always performed together.
Echinococcus Abs	2 mL serum REFRIGERATE	IHA granulosus: < 1:64 titer Low titers < 1:128 must be checked with a control. False negatives are possible. Multilocularis (EIA): Not detectable	Test performed weekly.	These tests are always performed together.
Echinococcus multilocularis Method: EIA	1 mL serum REFRIGERATE	Not detectable	Test performed TUES & THUR.	
Echo Virus *See Entero Virus				
Ehrlichia Abs IgG, IgM Method: IF	2 mL serum REFRIGERATE	IgG < 1:64 titer: abs not detectable IgM < 1:20 titer: abs not detectable	Test performed once weekly.	These tests are always run together.
Endomysium IgA Abs (Transglutaminase) Method: ELISA	1 mL serum REFRIGERATE	<20 RU/mL	Test performed twice weekly.	
Entero Virus (Coxsackie Abs) Method: CF	2 mL serum REFRIGERATE	< 1:10 titer	Test performed daily.	
Erythropoietin (EPO) Method: LIA	1 mL serum (not heparin or EDTA plasma) REFRIGERATE	5-25 mU/mL	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Estrogen Receptors Method: RIA	1 g of tumor tissue (Minimum: 500 mg). Freeze specimen immediately after removal. Send FROZEN. Please quote relevant clinical data.	< 10 fMol/mg (negative) 11-20 fMol/mg (borderline) 21-100 fMol/mg (positive) >100 fMol/mg (high positive)	Test performed once weekly.	Results ready one week later. This test is always performed with Progesterone receptors.
Ethosuximide (Zarontin) Method: FPIA	2 mL serum (minimum 0.5 mL for pediatric sample). Draw 2-4 hours after last oral dose REFRIGERATE	Therapeutic range: 40-100 µg/mL	Test performed daily.	
Factor II Method: BCT	1 mL citrate plasma FROZEN	70-120%	Test performed on FRIDAYS.	Always send a separate sample for this test.
Factor II Molecular Analysis (Coagulation Factor II)	7 mL EDTA blood Special monovettes or vacutainers must be used, NOT normal EDTA tubes. DO NOT centrifuge and DO NOT take aliquots for other analyses. Please send only unopened tubes.	See Report	1 – 2 weeks	Gene F2
Factor V Method: BCT	1 mL citrate plasma FROZEN	70-140%	Test performed on FRIDAYS.	Always send a separate sample for this test.
Factor V Mutation Gene (Leiden Mutation) Method: PCR	(minimum) 2 mL EDTA blood – use Bioscientia tubes REFRIGERATE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	Negative	Test performed once weekly.	
Factor VII Method: BCT	1 mL citrate plasma FROZEN	70-120%	Test performed on FRIDAYS.	Always send a separate sample for this test.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Factor VIII Activity (Von Willebrand Factor) Method: BCT	1 mL citrate plasma FROZEN	70-150%	Test performed TUE & FRI.	Always send a separate sample for this test.
Factor VIII Associated Antigen (Von Willebrand Factor) Method: BCT	1 mL citrate plasma FROZEN	50-160%	Test performed TUE & FRI.	Always send a separate sample for this test.
Factor VIII Multimers Method: electrophoresis and Immunoblot	5 mL citrate blood, NOT FROZEN. Draw on day of shipment. REFRIGERATE Deliver to the laboratory no later than 1300. Specimens will be accepted Monday-Wednesday only.	See Report	Test performed once weekly.	Always send a separate sample for this test. All other factors require frozen citrate plasma.
Factor VIII Ristocetin Cofactor (Von Willebrand Factor) Method: coaglumetric	1 mL citrate plasma FROZEN	50-150%	Test performed on TUE & FRI.	Always send a separate sample for this test.
Factor IX Method: BCT	1 mL citrate plasma FROZEN	70-120%	Test performed FRIDAYS.	Always send a separate sample for this test.
Factor X Method: BCT	1 mL citrate plasma FROZEN	70-120%	Test performed FRIDAYS.	Always send a separate sample for this test.
Factor XI Method: BCT	1 mL citrate plasma FROZEN	70-120%	Test performed FRIDAYS.	Always send a separate sample for this test.
Factor XII Method: BCT	1 mL citrate plasma FROZEN	70-150%	Test performed FRIDAYS.	Always send a separate sample for this test.
Factor XIII Method: BCT	1 mL citrate plasma FROZEN	70-140%	Test performed FRIDAYS.	Always send a separate sample for this test.
Fatty Acids, Nonesterified FFA (Free Fatty Acids) Method: Colorimetry	1 mL EDTA plasma (Not heparin plasma) or 1 mL serum. Freeze immediately and send FROZEN	Adults: 0.19-0.90 mMol/L	Test performed daily.	
Fecal Fat *See Lipids				
Felbamate Method: HPLC	1 mL serum REFRIGERATE	10-100 mcg/mL	Test performed once weekly.	
Filariosis IgG Abs Method: EIT	2 mL serum REFRIGERATE	<10 MONA	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Flunitrazepam (Rhoypnol) Method: HPLC	2 mL serum REFRIGERATE	Therapeutic Range 5.0-15.0 ng/mL Toxic Range: > 50 ng/mL	Test performed twice weekly.	
Folic Acid in Erythrocytes (Folate) Method: LIA	1 mL EDTA blood. SEND IMMEDIATELY REFRIGERATE	280-800 ng/mL borderline: 180-280 ng/mL	Test performed daily.	
Food panel 20 Method: LIA	3 mL serum REFRIGERATE	CLA-class: 0 negative – no IgE abs detectable CLA-class: 1 weakly positive – very low concentration of IgE spec. abs detectable CLA-class: 2 positive – low concentration of IgE spec. abs detectable CLA-class: 3 positive – increased concentration of IgE spec. abs detectable CLA-class: 4 positive – high concentration of IgE spec. abs detectable CLA-class: 5 positive – extremely high concentration of IgE spec. abs detectable	Test performed MON, WED, & FRI.	Includes: almond, hazelnut, peanut, walnut, sesame, soya bean, rye flour, wheat flour, carrot, celery, potato, tomato, apple, peach, casein, milk, egg white, egg yolk, cod (fish), and crab

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Fragile X Syndrome (FMR1-Gene) Method: DNA extraction, PCR, probe hybridization	5-10 mL EDTA blood – use Bioscientia tube ROOM TEMPERATURE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	See Report	Test performed once weekly.	
Free PSA *See Prostatic Specific Antigen Structure				

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Free Testosterone Method: RIA	2 mL heparin plasma or 2 mL serum FROZEN	Male: 20-39 years: 8.8-27 pg/mL 40-59 years: 7.2-23 pg/mL 60-80 years: 5.6-19 pg/mL Female: 20-39 years: <2.6 pg/mL 40-59 years: <2.0 pg/mL 60-80 years: <1.6 pg/mL Reference range for children: Male: 0-1 week: 3.2-16.4 pg/mL 2-7 weeks: 1.8-10.7 pg/mL 2-3 months: <7.3 pg/mL 4-5 months: <5.4 pg/mL 6-24 months. <1.0 pg/mL 2-7 years: <0.5 pg/mL 8-9 years: <1.5 pg/mL 10-11 years: <0.8 pg/mL 12-13 years: <6.6 pg/mL 14-15 years: <21 pg/mL 16-17 years: 4.8-26 pg/mL Female: 0-1 week: <16.5 pg/mL 2-7 weeks: <4.9 pg/mL 2-3 months: <4.3 pg/mL 4-5 months: <0.6 pg/mL 6-24 months: <0.4 pg/mL 2-7 years: <0.6 pg/mL 8-9 years: <0.9 pg/mL 10-11 years: <1.7 pg/mL 12-13 years: 0.16-1.8 pg/mL 14-15 years: <3.1 pg/mL 16-17 years: 1-2.6 pg/mL	Test performed MON, WED, & FRI.	
Fructosamine Method: NBT	1 mL serum REFRIGERATE	< 285 micromol/L	Test performed MON, WED, & FRI.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
FSME IgG & IgM ABS *See Tick-borne Encephalitis IgG and IgM ABS				
FT3 (Free Triiodothyronine) Method: LIA-ACS	1 mL serum REFRIGERATE	Adults: 2.0-4.2 pg/mL Reference range for children: Cord blood: 0.9-2.0 pg/mL 1-3 days: 2.4-6.3 pg/mL 3-30 days: 2.2-5.4 pg/mL 30-60 days: 2.2-5.0 pg/mL 2-12 months: 2.2-5.0 pg/mL 1-5 years: 2.1-4.8 pg/mL 5-10 years: 2.1-4.8 pg/mL 10-20 years: 2.0-4.2 pg/mL	Test performed daily.	
G-6-PD Method: enzymatic	4 mL EDTA blood or heparin blood (minimum: 1mL for pediatric samples) REFRIGERATE	7.90-20.5 U/g Hb	Test performed on TUE & FRI.	
Gabapentin Method: HPLC	1 mL serum REFRIGERATE	There is no therapeutic range available. A maximum value of 4.0 mg/L after 2-3 hours is obtained after oral dosage of 200 mg Gabapentin. Biological half-life period is approx. 6 hours	Test performed once weekly.	
Galactokinase Method: enzymatic	5 mL EDTA blood REFRIGERATE	Neonates: >80 mU/g Hb From 1 year: > 20 mU/g Hb Heterozygote: 8-12 mU/g Hb Homozygote: <2 mU/g Hb Adults: > 20 mU/g Hb	Test performed once weekly.	
Galactose (B, U)	1 mL NaF blood or 30 mL urine from 24-hour collection (add Sodium Azide to the aliquot of urine)	Blood: Adults: < 4.3 mg/dL Neonates: < 10 mg/dL Urine: < 10 mg/24 hr	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Galactose-1-Phosphate Method: fluorimetric	2 mL FROZEN hemolysate (wash 1 mL EDTA blood with saline solution, centrifuge, and hemolyze the erythrocytes with 0.4 mL water). Do not send EDTA blood.	7-22 mcMol/L ery conc. Galactosaemia patients under diet: 50-150 mcMol/L ery conc.	Test performed once weekly.	
Galactose-1-phosphate-uridyltransferase, quantitative Method: enzymatic	4 mL EDTA blood REFRIGERATE	Normal: >308 mU/g Hb Heterozygote: 140-222 mU/g Hb Homozygote: <8 mU/g Hb Heterozygote/duarte variant: 57-140 mU/g Hb	Test performed once weekly.	
Gastrin Method: RIA	2 mL serum, fasting sample. Blood should be centrifuged within 20 minutes and serum FROZEN immediately. Send FROZEN.	Adults: < 150 pg/mL	Test performed TUE & FRI.	Children's reference ranges available once weekly
Gliadine Abs IgA & IgG specific (Gluten Abs) Method: FEIA	2 mL serum REFRIGERATE	IgA: < 3mg/L IgG: <3 years: 30 mg/L >3 years: 18 mg/L	Test performed MON, WED, & FRI.	
Glomerular basal membrane ABS *See Basal Membrane ABS				
Glucagon Method: RIA	2 mL EDTA plasma FROZEN	60 - 177 ng/L	Test performed once weekly.	Always send a separate sample for this test.
Glucose-6-Phosphate Dehydrogenase *See G-6-PD				
Glutamate Decarboxylase Abs. (GAD Abs) Method: RIA	1 mL CSF or 1 mL serum REFRIGERATE	CSF: negative Serum: <0.9 U/mL Borderline: 0.9-1.3 U/mL	Test performed on TUE & FRI.	
Gold Method: AAS	2 mL serum or heparin blood REFRIGERATE	Oral: 30-60 mcg/dL Injection: <500 mcg/dL Optimal Range: 200-300 mcg/dL	Test performed weekly.	Results ready within two weeks.
Gonococcal Abs Method: CF	1 mL serum REFRIGERATE	< 1:10 titer = no abs detected	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Growth Hormone (HGH) *See HGH				
Hair Analysis	2 grams of hair required	See Report		
Ham's Test Method: tube test	2 mL EDTA blood REFRIGERATE	See Report	Test performed once weekly.	
Hanta Virus Abs Method: IF	2 mL serum REFRIGERATE	For all: Not Detectable	Test performed once weekly.	Includes: Hantaan virus IgG, IgM & Puumala virus IgG, IgM
HAV RNA PCR (feces) PCR	10 g feces	Negative	Test performed once weekly.	
HBV DNA Qualitative Method: PCR	7 mL EDTA blood – use Bioscientia tubes REFRIGERATE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	Negative	Test performed twice weekly.	
HBV DNA Quantitative Method: real-time PCR (light cycler)	7 mL EDTA blood – use Bioscientia tubes REFRIGERATE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	Reported as: HBV DNA copies x 1000/mL Lower limit of detection: 1000 genome copies/mL	Test performed twice weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
HCV Genotyping Method: PCR	7 mL EDTA blood – use Bioscientia tubes REFRIGERATE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	An interferon-alpha therapy prognosis is as follows for: Genotype 1: probably unfavorable Genotype 2 + 3: probably favorable Genotype 4, 5 + 6: so far not known The classification in 6 genotypes and their subtypes is according to Simmonds.	Test performed once weekly.	
HCV RNA Qualitative Method: PCR	7 mL EDTA blood – use Bioscientia tubes REFRIGERATE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	Negative	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
HCV RNA Quantitative Method: b-DNA	7 mL EDTA blood – use Bioscientia tubes REFRIGERATE Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	Limit of detection: 3.2 Reported in copies x 1000/mL	Test performed MON & WED.	
Helicobacter Ag EIA	10 grams feces Stable at 2-8°C for 72 hours, otherwise freeze.	Not detectable	Test performed once weekly.	
Helicobacter Immunoblot IgA & IgG Method: Immunoblot	1 mL serum REFRIGERATE	Range for both: not detectable	Test performed daily.	
Helicobacter Pylori IgA & IgG Method: EIA	1 mL serum REFRIGERATE	IgA: not detectable (<10 U/mL) IgG: not detectable (<10 U/mL)	Test performed daily.	Helicobacter Immunoblot IgA and IgG will automatically be performed and charged for on all positive and borderline helicobacter IgA results.
Hemochromatosis Gene (HFE) DNA Extraction, PCR, Probe Hybridization	7 mL EDTA blood Special monovettes or vacutainers must be used. DO NOT centrifuge and do not take aliquots for other analyses. Please send only unopended tubes.	See Report	Test performed once weekly.	
Hemosiderin FE Coloring Microscopy	10 mL urine	See Report	Test performed once weekly.	
Hepatitis A Abs *See Anti HAV Screening				
Hepatitis Delta Abs Method: EIA	1 mL serum REFRIGERATE	Not detectable	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Hepatitis E Virus Abs EIA	1 mL serum REFRIGERATE	Not detectable	Test performed daily.	
Herpes Profile	2-3 mL serum REFRIGERATE	HSV I abs IgG Specific and HSV II abs IgG specific Ratio <0.9 - no abs detectable Ratio 0.9-1.1 - borderline Ratio >1.1 - abs detectable HSV I/HSV II/ Ratio: <0.7 = mainly HSV type II abs. 0.7-1.3 = HSV abs not differentiable > 1.3= mainly HSV type I abs HSV IgM abs Not detectable	Test performed twice weekly.	The index is only reported if a value is obtained for both IgG's. If < or > results obtained, no index will be calculated.
Herpes Simplex Virus ABS (Type I/II) Method EIA	1 mL serum REFRIGERATE	IgG (type I/II) – not detectable IgM (type I/II) – not detectable	Test performed daily except Mondays.	
Herpes Simplex Virus 1 & 2 DNA (PCR)	2 mL CSF or 7 mL EDTA blood (Special monovettes or vacutainers must be used, NOT normal EDTA tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.) Swabs or biopsies can also be sent	Negative	Test performed once weekly.	Use Bioscientia's tubes for collection of EDTA blood.
Herpes Virus Type 6 IgG & IgM Abs (Human Herpes Virus Type 6) EIA	2 mL serum REFRIGERATE	Reference Range for both IgG and IgM: < 0.9 Index – abs not detectable 0.9 – 1.1 Index – borderline > 1.1 Index – abs detectable	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Hexokinase Method: enzymatic	1 mL EDTA blood REFRIGERATE	0.64-1.06 U/g Hb (37 degrees centigrade)	Test performed once weekly.	
Hexosaminidase A Method: TLC	2 mL serum REFRIGERATE	See Report	Test performed once weekly.	If only Hexosaminidase is written on the request form, both A & B will be performed and charged for. Results ready 2 – 3 weeks later.
Hexosaminidase B & Hexosaminidase A & B Method: TLC	2 mL serum REFRIGERATE	See Report	Test performed once weekly.	Always performed together as diagnostically relevant. Results ready 2 – 3 weeks later.
HGH (Human Growth Hormone) Method: LIA	1 mL serum REFRIGERATE	< 7 ng/mL: single values are of no significance; always perform stimulation test.	Test performed daily.	Draw basal specimen after needle has been in place for approx. 30 minutes.
Hippuric Acid Method: GC	30 mL urine REFRIGERATE	< 1.5 g/L	Test performed once weekly.	
Histamine (B) Method: HPLC	5 mL heparin blood FROZEN	20-100 mcg/L	Test performed once weekly.	
Histamine (U) Method: LC-MS	30 mL urine from a 24 hr. collection. Put 5-10 mL acetic acid in the 24 hr. urine container before collection. Quote 24 hrs volume. REFRIGERATE	10-89 mcg/24 hr. (corresponds 10-73 mcg/g creatinine)	Test performed once weekly.	
Histone Abs ELISA	1 mL serum REFRIGERATE	< 20 AU/mL (AU = Arbitrary Units)	Test performed once weekly.	
Histoplasmosis Abs Method: Ouchterlony technique.	1 mL serum REFRIGERATE	Negative	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
HIV-1 Quant. Method: bDNA 3.0	7 mL EDTA blood. Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimen and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes.	>50 copies/mL	Test performed twice weekly.	From now on absolute values will be reported as copies/mL. Lower limit of detection of the new bDNA-generation (3.0) is 50 copies/mL) (dynamic range 50-500000 copies/mL). Average results of the new method will be increased by factor 1.6 (range 1.0-3.4) as compared to the old methodology (bDNA 2.0)
HLA B27 Flow Cytometry	3 mL EDTA blood Special monovettes or vacutainers must be used, not normal EDTA tubes. Use Bioscientia tubes. DO NOT centrifuge and do not take aliquots for other analyses. Send only unopened tubes. Please state date & time of collection. Send to Lab immediately.	See Report	Test performed daily.	
Homocysteine Method: LC-MS/MS	3 mL Heparin/NaF plasma Fasting sample (request special tubes) REFRIGERATED To send specimens for homocysteine, you collect the blood as normally in a syringe and then transfer immediately into our grey topped homocysteine tube, tip to and fro to mix and send that tube to us.	Female: 19–30 yrs: up to 11.3 µmol/L 31-60 yrs: up to 13.7 µmol/L 61-70 yrs: up to 15.0 µmol/L over 71 yrs: up to 17.9 µmol/L Male: 19-50 yrs: up to 13.7 µmol/L 51-70 yrs: up to 15.0 µmol/L over 71 yrs: up to 17.9 µmol/L	Test performed daily.	
HSV 1 & 2 (PCR) *See Herpes Simplex Virus 1 & 2 DNA (PCR)				

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
HTLV 1/2 Ab	2 mL serum REFRIGERATED	HTLV 1/2 EIA: not reactive HTLV 1/2 Western blot: negative	Test performed once weekly.	Results are ready two weeks later.
HVA (Homovanillic Acid) Method: HCl without pH	2x30 mL of 24h urine collection. Please state the 24h urine volume. Immediately after collection, mix the 24h urine well. Prepare the shipping tube to contain 0.5 mL of 25% hydrochloric acid, fill tube with urine and mix well. Ensure pH value between 2-4. Do not use acetic acid or boric acid. Catecholamines, VMA and Metanephrines can also be performed in these specimens. REFRIGERATE	< 2 years: <4.1 mg/24hr. < 8 years: <5.9 mg/24 hr. < 16 years: < 7.0 mg/24 hr. >16 years: < 10.3 mg/24 hr.	Test performed daily.	Diet: It is recommended that the patient has NO intake for 2 days prior to urine sampling of the following: nuts, citrus fruits plus no cocoa, coffee or vanilla containing products. Medication: If clinical condition allows, it is also recommended that the patient stops taking catecholamines (epinephrine, norepinephrine, dopamine), MAO inhibitors, or catecholamine-reuptake inhibitors at least 2 days prior to sampling.
Hydroxyproline, Total (S)	2 mL serum REFRIGERATE	< 600 mcg/dL	Test performed weekly.	
IgA Quantitative (S) Nephelometric	1 mL serum REFRIGERATE	Adults: 0.7 – 4.0 g/L Neonates: Not detectable 1 – 3 months – 0.05 – 0.5 g/L 4 – 6 months – 0.08 – 0.8 g/L 7 – 12 months – 0.3 – 1.4 g/L 13 – 24 months – 0.3 – 1.2 g/L 3 – 5 years – 0.4 – 1.8 g/L 6 – 9 years – 0.6 – 2.2 g/L 10 – 13 years – 0.7 – 2.3 g/L	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
IgE Quantitative (S) ILMA-ACS	1 mL serum REFRIGERATE	Children < 1 year: > 10 U/mL – atopy possible > 50 U/mL – atopy high risk Children < 10 years: > 20 U/mL – atopy possible > 50 U/mL – atopy high risk Children > 10 years and adults: < 25 U/mL – atopy unlikely > 100 U/mL –atopy probable	Test performed daily.	
IGF-1 (Somatomedin C) Method: LIA	1 mL serum REFRIGERATE	Results are in ng/mL (conversion to U/mL not possible) Female: 0-1 year: 19-132 ng/mL 2-3 years: 30-248 ng/mL 4-5 years: 41-295 ng/mL 6-7 years: 61-354 ng/mL 8-9 years: 99-490 ng/mL 10-11 years: 158-692 ng/mL 12-13 years: 214-881 ng/mL 14-15 years: 219-851 ng/mL 16-17 years: 182-668 ng/mL 18-19 years: 158-550 ng/mL 20-24 years: 166-316 ng/mL 25-29 years: 136-288 ng/mL 30-34 years: 122-269 ng/mL 35-39 years: 115-254 ng/mL 40-44 years: 107-237 ng/mL 45-49 years: 102-221 ng/mL 50-59 years: 85-204 ng/mL 60-69 years: 65-168 ng/mL >70 years: 48-132 ng/mL **Male: SEE NEXT PAGE**	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
IGF-1 (Somatomedin C) (continued)		Male: 0-2 year: 22-132 ng/mL 2-3 years: 28-138 ng/mL 4-5 years: 38-172 ng/mL 6-7 years: 52-240 ng/mL 8-9 years: 74-398 ng/mL 10-11 years: 107-582 ng/mL 12-13 years: 155-741 ng/mL 14-15 years: 219-741 ng/mL 16-17 years: 234-624 ng/mL 18-19 years: 150-537 ng/mL 20-24 years: 136-490 ng/mL 25-29 years: 126-359 ng/mL 30-34 years: 112-320 ng/mL 35-39 years: 102-305 ng/mL 40-44 years: 95-299 ng/mL 45-49 years: 88-292 ng/mL 50-59 years: 67-292 ng/mL 60-69 years: 44-320 ng/mL >70 years: 40-320 ng/mL		

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
IGFBP-3 (Insulin Like Growth Factor Binding Protein 3) Method: RIA	1 mL serum REFRIGERATED	Units are µmol/mL Age in yrs. Male Female 0-2 0.94-1.76 0.66-2.51 2-4 1.12-2.33 0.84-3.77 4-6 1.16-3.13 1.32-3.60 6-8 1.32-3.38 1.21-4.66 8-10 1.35-3.94 1.58-3.99 10-12 1.53-5.02 1.93-5.46 12-14 1.73-5.11 1.78-6.08 14-16 1.90-6.40 2.02-5.44 16-18 1.70-6.04 1.88-5.29 18-20 1.52-6.01 1.63-6.02 20-22 1.79-5.41 1.82-5.35 22-24 1.45-4.75 1.45-5.69 24-26 1.15-4.27 1.51-4.47 26-28 1.24-5.18 1.38-4.70 28-30 1.23-4.27 1.19-5.43 30-45 1.29-4.06 1.29-4.06 45-70 1.31-3.22 1.31-3.22	Test performed WED.	
IgG, Quantitative (CSF) Method: nephelometric	1 mL CSF REFRIGERATE	< 34 g/L	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
IgG Subclasses Method: nephelometric	3 mL serum REFRIGERATE	Units: g/L IgG 1 0-1year: 1.8-7.7 1-2 years: 2.5-8.5 2-4 years: 3.2-9.4 4-6 years: 3.7-10.0 6-9 years: 4.0-10.8 9-12 years: 4.0-11.5 12-18 years: 3.7-12.8 >18 years: 4.9-11.4 IgG 2 0-1year: 0.38-2.3 1-2 years: 0.38-2.6 2-4 years: 0.52-3.0 4-6 years: 0.72-3.4 6-9 years: 0.85-4.1 9-12 years: 0.98-4.8 12-18 years: 1.06-6.1 >18 years: 1.50-6.4 IgG 3 0-1 year: 0.14-0.97 1-2 years: 0.15-1.13 2-4 years: 0.14-1.26 4-6 years: 0.13-1.33 6-9 years: 0.13-1.42 9-12 years: 0.15-1.49 12-18 years: 0.18-1.63 >18 years: 0.20-1.10 IgG 4 0-1 year: <0.03-0.43 1-2 years: <0.03-0.79 2-4 years: <0.03-1.27 4-6 years: <0.03-1.58 6-9 years: <0.03-1.89 9-12 years: 0.03-2.10 12-18 years: 0.04-2.30 >18 years: 0.08-1.40	Test performed twice weekly.	
IgM, Quantitative (CSF) Nephelometric	1 mL CSF REFRIGERATE	< 1.3 g/L	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
IgM, Quantitative (S) Nephelometric	1 mL serum REFRIGERATE	Adults: 0.4 – 2.3 g/L Newborn: 0.1 – 0.3 g/L 1 – 3 months: 0.1 – 0.7 g/L 4 – 6 months: 0.2 – 1.0 g/L 7 – 12 months: 0.3 – 1.0 g/L 13 – 24 months: 0.4 – 1.4 g/L 3 – 5 years: 0.4 – 1.8 g/L 6 – 9 years: 0.4 – 1.6 g/L 10 – 13 years: 0.4 – 1.5 g/L	Test performed daily.	
Imipramine & Desipramine Method: HPLC	3 mL serum REFRIGERATE	Therapeutic Range: 150-250 ng/mL	Test performed TUE & FRI.	Imipramine is not performed individually
Immunofixation Includes IgA, IgG & IgM (Immunoelectrophoresis) Method: nephelometric	1 mL serum REFRIGERATE	See Report for details	Test performed daily.	Please refer under single tests for reference ranges.
Influenza A Method: CF	1 mL serum REFRIGERATE	<1:10 titer = abs not detectable 1:10-1:20 titer = abs from previous infection >1:20 titer = fresh infection suspected	Test performed daily.	
Influenza B Method: CF	1 mL serum REFRIGERATE	< 1:10 titer = abs not detectable 1:10-1:20 = abs from previous infection >1:20 = fresh infection suspected	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Inhalation Panel 20 Method: LIA	3 mL serum REFRIGERATE	CLA-class: 0 negative – no IgE abs detectable CLA-class: 1 weakly positive – very low concentration of IgE spec. abs detectable CLA-class: 2 positive – low concentration of IgE spec. abs detectable CLA-class: 3 positive – increased concentration of IgE spec. abs detectable CLA-class: 4 positive – high concentration of IgE spec. abs detectable CLA-class: 5 positive – extremely high concentration of IgE spec. abs detectable	Test performed MON, WED, & FRI.	Includes alder, birch, hazel pollen, grass mix, rye pollen, plantain pollen, mugwort, house dust mite Dermatophagoides farinae, house dust mite Dermatophagoides pteronyssinus, cat, dog, guinea pig, hamster, horse, rabbit, feather mix, Altenaria tenuis, Aspergillus spec., Cladosp. herbarum, Penicillium notatum
Insulin (S) Method: CLIA	1 mL serum, fasting blood sample FROZEN	2.5-24 µU/mL (after 12hrs fasting)	Test performed daily.	
Insulin Abs (Human) Autoantibodies Method: RIA	2 mL serum REFRIGERATE	< 1.0 U/mL	Test performed TUE.	
Insulin C-Peptide *See C-peptide				
Intrinsic Factor Abs Method: RIA	1 mL serum REFRIGERATE	Not detectable	Test performed WED.	
Iodine, Total (S) Method: AAS	5 mL serum REFRIGERATE	46-70 mcg/L	Test Performed once weekly.	
Iodine, Total (U)	30 mL of a 24h urine. Protect from light. Please state 24 hr. volume REFRIGERATE	27-403 mcg/24 hr. dependent on diet and medication containing iodine	Test performed once weekly.	
Iron in Liver Tissue Method: AAS	50 mg tissue FROZEN	530-900 mcg/g dry weight (or 9.5-16.1 microMol/g)	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Islet Cell Abs (Qual and Quant) Method: Indirect IF	1 mL serum REFRIGERATE	For both: < 1:10 titer	Test performed TUE & THUR.	
Isoamylase (Alpha Amylase Isoenzymes) Method: enzymatic color test	1 mL serum REFRIGERATE	Total alpha amylase: 28-100 U/L Pancreatic alpha amylase:13-53 U/L Saliva alpha amylase: <47 U/L	Test performed once weekly.	
Lactate (CSF) Method: photometric	1 mL CSF FROZEN	11-19 mg/dL	Test performed daily.	
Lactate Dehydrogenase *See LDH				
Lamotrigin Method: HPLC	2 mL serum REFRIGERATE	Therapeutic Range: 0.5-4.5 mcg/mL Children: <15 mcg/mL	Test performed twice weekly.	
LAP (Leucine Aminopeptidase) Method: optimized standard method of DGKC	1 mL serum REFRIGERATE	11-35 U/L	Test performed daily.	
Laxative Screening Method: GC-MS	30 mL urine REFRIGERATE	Not detectable	Test performed once weekly.	Includes: Bisacodyl, Phenolphthalein, Rhein)
LDH Isoenzymes (Lactate Dehydrogenase Isoenzymes) Method: electrophoresis (agarose)	1 mL serum ROOM TEMPERATURE DO NOT REFRIGERATE OR FREEZE	Females: 135-214 U/L Male: 135-225 U/L Children: 120-300 U/L LDH-1 14-26% LDH-2 29-39% LDH-3 20-26% LDH-4 8-16% LDH-5 6-16%	Test performed THURSDAY.	
Lead (U) Method: AAS	10 mL of a 24-hr. urine collection; please state total volume of 24-hr urine collection REFRIGERATE	<27 µg/L	Test performed once weekly.	
Legionella ABS Method: IFT	2 mL serum REFRIGERATE	See Report	Test performed daily.	This analysis covers the most important serotypes of L. pneumophilia (types 1-14), also various types such as L. bozemanii, dumoffii, gormanii, jordanis, longbeachae, micdadei.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Legionella Pneumophila Antigen Method: EIA	10 mL urine REFRIGERATE	Not detectable	Test performed once weekly.	
Leiden Mutation *See Factor V mutation gene				
Leishmania IHA & IgG & IgM Method for IgG and IgM: IF	2 mL serum REFRIGERATE	IHA: negative IgG: <1:40 titer – abs not detectable IgM: <1:20 titer – abs not detectable	Test performed once weekly.	
Leptospira Abs Method: CF	2 mL serum REFRIGERATE	< 1:10 titer	Test performed TUE & THUR.	Includes: L. sejroe L. canicola L. grippotyphosa L. icterohaemorragiae L. Pomona
Lidocaine Method: HPLC	2 mL serum REFRIGERATE	Therapeutic Range: 1.5-5.0 mcg/mL	Test performed once weekly.	
Lipids, Total (F) Method: gravimetry	10 g of a well mixed 24 hr. feces sample. Quote weight of 24-hr collection. REFRIGERATE	Adults: <7g/24 hr. Infants: <2 g/24 hr.	Test performed MON & THUR .	Results ready Wednesday, Monday
Lipoprotein (a) Method: nephelometric	1 mL serum REFRIGERATE	<30 mg/dL	Test performed twice weekly.	
Lipoprotein Electrophoresis	2 mL serum, fasting blood sample. Send immediately. NOT FROZEN REFRIGERATE	Standard according to Fredrickson, See Report	Test performed once weekly.	This also includes Cholesterol – total, LDL-Cholesterol, HDL-Cholesterol, Triglycerides which are setup-up daily, result same day.
Listeria Abs Method: agglutination	1 mL serum REFRIGERATE	For all: < 1:50 = no abs detected 1:100-1:200 = borderline > 1:400 = acute infection suspected	Test performed daily.	Includes: L. type 1:H, L. type 1:0, L. type 4B:H,L. type 4B:0
Liver Kidney Microsomal Abs Method: indirect IF	3 mL serum REFRIGERATE	< 1:80 titer	Test performed weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Lupus Anticoagulants/Lupus Inhibitors Method: coagulation	3 mL citrate plasma (1 part 3.8% sodium citrate mixed with 9 parts blood) FROZEN	Not detectable	Test performed weekly.	Always send a separate sample for this test.
Lymphocyte Chorionic Meningitis Virus IgG & IgM (LCM) Method: IF	1 mL serum REFRIGERATE	IgG <1:8 titer; if infection is suspected, follow up is recommended IgM <1:8 titer	Test performed once weekly.	These tests are always performed together.
Lysozyme (S) Method: nephelometry	2 mL serum Send Immediately FROZEN	3.2-9.9 mcg/mL	Test performed MON & THUR.	
Lysozyme (U) Method: nephelometry	2 mL urine Send Immediately FROZEN	< 2 mcg/mL	Test performed MON & THUR.	
Magnesium (U) Method: AAS	10 mL of 24 hour urine collection. Adjust pH of 10 mL aliquot with hydrochloric acid to pH 2-3, mix well. Please state volume of 24 hour urine. REFRIGERATE	0.6-12 mMol/24 hour	Test performed daily.	
Malaria Abs IF	1 mL serum REFRIGERATE	< 1:20 titer – no indication of malaria infection 1:20 – 1:80 titer – indication of a still active malaria infection > 1:80 titer – indication of previous or still active malaria infection	Test performed twice weekly.	
Malaria & Plasmodium falciparum Antigen Method: IF & microscopy	3 air dried blood smears and 5 mL EDTA blood REFRIGERATE	Not detectable	Test performed daily.	
Mercury (B) Method: AAS	2 mL heparin blood REFRIGERATE	<10 mcg/L tolerable: <50 mcg/L	Test performed twice weekly.	
Mercury (F) Method: AAS	30 grams feces REFRIGERATE	See Report	Test performed weekly.	
Mercury (U) Method: AAS	20 mL urine REFRIGERATE	Up to 7 mcg/L Tolerable: up to 100 mcg/L	Test performed twice weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Metanephrine & Normetanephrine, (Total) Method: HPLC with electrochemical detection	2 X 30 mL of 24 hour urine collection. Immediately after collection, mix the 24 hr. urine well. Please state 24 hr. urine volume. Prepare the shipping tube to contain 0.5 mL of 25% hydrochloric acid, fill tube with urine and mix well. Ensure pH value between 2-4. Do not use acetic acid or boric acid. REFRIGERATE	Metanephrine: 52-341 µg/24 hour Normetanephrine: 88-444 µg/24 hour	Test performed MON, WED, & FRI.	**Diet:** It is recommended that the patient have no intake for 2 days prior to collection of the specimen of the following: nuts, citrus fruits, cocoa, coffee, or vanilla containing products. **Medication:** If clinical condition allows, it is also recommended that the patient stops taking catecholamines (epinephrine, norepinephrine, dopamine), MAO inhibitors or catecholamine reuptake inhibitors at least 2 days prior to sampling. Catecholamines, VMA and Homovanillic acid can also be performed in these specimens.
Methotrexate Method: FPIA	2 mL serum REFRIGERATE	Minimal cytotoxic concentration: 0.01 µmol/L. See Report for complete interpretation.	Test performed once weekly.	
Methylmalonic Acid (U) Method: GC-MS	30 mL urine REFRIGERATE	See Special Report	Test performed once weekly.	Results ready one week later
Microalbumin *See Albumin				
Mucopolysaccharides, quantitative Method: HPLC	30 mL urine. Quote date of birth. FROZEN	See Report for interpretation	Test performed once weekly.	
Mycoplasma pneumonia Abs Method: CF	1 mL serum REFRIGERATE	<1:10 titer: abs not detectable 1:10-1:20 titer: abs from previous infection >1:20 titer: fresh infection suspected	Test performed daily.	
Myelin Associated Glycoprotein Abs (MAG) (IgA, IgG, IgM spec.) IF	2 mL serum REFRIGERATE	For All: Negative	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Myoglobin, quantitative (S) Method: nephelometer	1 mL serum FROZEN	<70 ng/mL	Test performed TUE & FRI.	
Myoglobulin, quantitative (U) Method: nephelometer	10 mL urine FROZEN	<20 ng/mL	Test performed TUE & FRI.	
N-Acetylprocainamide *See Procainamide				
Nickel (S) Method: AAS	5 mL serum REFRIGERATE	<6 mcg/L	Test performed twice weekly.	Results ready within two weeks.
Nickel (U) Method: AAS	30 mL urine REFRIGERATE	<10 mcg/L	Test performed twice weekly.	Results ready within two weeks.
Nicotine (U) Method: HPLC	30 mL urine REFRIGERATE	Smoker: <15000 mcg/L Passive smoker: <32 mcg/L Non-smoker: <2 mcg/L	Test performed once weekly.	
Noradrenaline *See Catecholamines				
Nortriptyline Method: HPLC	3 mL of serum REFRIGERATE	Therapeutic Range: 50-150 ng/mL	Test performed TUE & FRI.	
Oligoclonal Banding Method: isoelectric focusing	1 mL serum *and* 2 mL CSF REFRIGERATE	See Report	Test performed FRIDAYS.	Date of birth required. Results ready Mondays.
Organic Acids Screen Method: GC-MS	30 mL urine REFRIGERATE	See Report.	Test performed daily.	Please quote all relevant clinical data including patient's age, sex and whether on medication.
Osteocalcin Method: CLEIA	1 mL serum FROZEN	Female: <50 years: 2.7-25 ng/mL >50 years 1.9-25 ng/mL Male: 3.4-25 ng/mL	Test performed daily.	Children's reference ranges available once weekly.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Osteoporosis Screen Method: calculation	30 mL urine REFRIGERATE	Calcium: 0.032-0.11 g/g Creatinine Creatinine: Adults: 570-2410 mg/L Deoxypyridinoline: Female up to 50 years: 20-40 µg/g Creatinine Female over 50 years: 20-65 µg/g Creatinine Male: 15-45 µg/g Creatinine Pyridinoline: Female up to 50 years: 105-185 µg/g Creatinine Female over 50 years: 115-210 µg/g Creatinine Male: 95-215 µg/g Creatinine Interpretation: See Report	Test performed TUE & THUR.	
Oxalate Method: Enzymatic color test	30 mL of a 24 hour urine collection mixed with approx 0.5 mL 25% hydrochloric acid. Quote 24h urine volume. REFRIGERATE	Male: 7 – 44 mg/24 hour Female: 4 – 31 mg/24 hour Children: 13 – 38 mg/24 hour	Test performed MONDAYS.	
Oxcarbazepine Structure	3 mL serum REFRIGERATE	Oxcarbazepine therapeutic range: < 3.0 µg/mL, Oxcarbazepine is quickly metabolized and can be determined as 10-OH-metabolite. Oxcarbazepine (10-OH-metabolite) therapeutic range: 5.0 – 30 µg/mL	Test performed once weekly.	NOTE: These tests are always performed together.
p-ANCA *See ANCA-C and ANCA-P				
Palladium (B) Method: AAS	1 mL EDTA blood REFRIGERATE	<0.4 mcg/L	Test performed once weekly.	Results ready two days later.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Pancreatic Elastase (F) Method: ELISA	1 gram feces REFRIGERATE	Normal: >200 mcg/g Mild pancreatic insufficiency: 100 – 200 mcg/g Severe pancreatic insufficiency: <100 mcg/g	Test performed MON & THUR.	
Pancreatic Elastase (S) Method: ELISA	1 mL serum REFRIGERATE	<3.5 mcg/L	Test performed once weekly.	
Papilloma Virus DNA (HPV-DNA) Method: Hybridization with immunological reaction	Genital swab in transport medium (use our special kits) REFRIGERATE	Negative	Test performed TUE & FRI.	Typing includes: "low risk" group: 6, 11, 42, 43, and 44 "high risk" groups: 16, 18, 31, 33, 35, 45, 51, 52, and 56
Parakeet Fanciers Disease *See Avian Precipitant Abs				
Parathyroid Hormone *See PTH intact				
Parietal Cell Abs Method: IFT	1 mL serum REFRIGERATE	Not detectable	Test performed daily.	
Parotis Canaliculi & Acini Abs Method: fluorescence	2 mL serum REFRIGERATE	<1:10 titer: negative abs result	Test performed once weekly.	If positive, quantitative analysis will then be performed and charged for.
Parrot Fanciers Disease *See Avian Precipitant Abs.				
Parvo Virus B 19 Abs IgG & IgM Method: EIA	1 mL serum REFRIGERATE	For Both: Index <0.8 – abs not detectable Index 0.8-1.0 – borderline Index >1.0 – abs detectable	Test performed twice weekly.	
Parvo Virus B 19 Abs. Immunoblot IgG & IgM Method: Immunoblot	2 mL serum REFRIGERATE	Not detectable	Test performed weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Parvovirus (PCR)	2 mL CSF or 7 mL EDTA blood. Special monovettes or vacutainers must be used, not normal EDTA tubes. Always wear gloves when drawing specimens and use Bioscientia's tubes. Do not centrifuge and do not take aliquots for other analyses. Please send only unopened tubes. REFRIGERATE	Negative	Test performed once weekly.	This test requires prior approval by a pathologist before the specimen is drawn.
Pentachlorphenol Method: GC-MS	30 mL urine REFRIGERATE	<5 mcg/L	Test performed once weekly.	Results ready one week later.
Pentaporphyrin *See Porphyrins (Feces)				
Pertussis *See Bordetella Pertussis				
Phytanic Acid Method: GC-MS	2 mL serum REFRIGERATE	<5 mg/L	Test performed once weekly.	If you also request VLCFA you need not request Phytanic acid separately as it is included in the VLCFA analysis
Pigeon Fanciers Disease *See Avian Precipitant Abs.				
Plasmodium falciparum antigen *See Malaria				
Platelet Antibodies *See Anti Platelet Abs.				
Polio Virus 1,2 and 3 Abs Method: neutralization test	2 mL serum REFRIGERATE	Negative	Test performed weekly.	Best results are obtained by submitting acute and convalescent samples together (label specimens accordingly). Freeze acute sample until convalescent sample is drawn.
Porphobilinogen, quantitative Method: column chromatography within photometric detection	30 mL of a 24 hour urine collection, (during collection, keep cool and protect from light). Please state 24h urine volume. REFRIGERATE	Adults: <2 mg/24 hour	Test performed WED.	This specimen can also be used for delta-Aminolavulinic acid and porphyrins

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Porphyrins (F) Method: fluorometry	At least 10 grams of feces, not FROZEN, but protected from light.	Coproporphyrin: <6.0 mcg/g feces Heptaporphyrin: <1.0 mcg/g feces Hexaporphyrin: <1.0 mcg/g feces Pentaporphyrin: <1.0 mcg/g feces Protoporphyrin: <16.0 mcg/g feces Uroporphyrin: <1.0 mcg/g feces Total Porphyrins: <34 mcg/g feces	Test performed once weekly.	
Porphyrins in Erythrocytes, Total Method: Fluorometry	1 mL heparin blood REFRIGERATE	Hematocrit: Female: 0.37-0.47 I/L Male: 0.42-0.52 I/L Infants: 0.33-0.40 I/L Children 2-6 years: 0.34-0.41 I/L Hemoglobin: Infants: 14.0-20.0 g/dL Female: 12-16 g/dL Male: 14-18 g/dL Porphyrins, total (erythrocytes): <66 mcg/DL	Test performed once weekly.	In cases of iron deficiency and lead intoxication the porphyrins in erythrocytes are found as zinc Protoporphyrins and in erythropoetic protophorphyrias as free Protoporphyrins. This technique covers zinc and free Protoporphyrins.
Porphyrins (U) Method: HPLC	30 mL urine of a 24h collection REFRIGERATE	Coproporphyrin: <150 mcg/24 hrs Pentacarboxyporhyrin: <10 mcg/24 hrs Heptacarboxyporphyrin: <10 mcg/24 hrs Hexacarboxyporphyrin: <8 mcg/24 hrs Uroporphyrin: <24 mcg/24 hrs Total porphyrin: <210 mcg/24 hrs	Test performed TUE & THUR.	This specimen can also be used for delta-Aminolavulinic acid and Porphobilinogen quant.
Prealbumin	1 mL serum REFRIGERATE	<1 year: 0.10-0.19 g/L >1 year: 0.20-0.40 g/L	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Pregnantriol	20 mL of 24 hour urine collection; use our boric acid tubes, mix well. Check to ensure pH is between 4-7. Please state 24-hr urine collection volume. REFRIGERATE	<6 years: <0.15 mg/24 hour 6-11 years: <0.40 mg/24 hour 11-14 years: <1.50 mg/24 hour >14 years: < 2.00 mg/24 hour	Test performed once weekly.	
Primidone & Phenobarbital (mylepsinum) Method: FPIA	1 mL serum (minimum 0.5 mL sufficient for pediatric sample) REFRIGERATE	Primidone: 3 - 15 µg/mL Phenobarbital: 10 - 40 µg/mL	Test performed daily.	These tests are always performed together.
Pro Insulin Method: LIA	2 mL serum FROZEN	< 25 pMol/L	Test performed once weekly.	Results ready in four weeks.
Procainamide/N-Acetylprocainamide (NAPA)	3 mL serum	Therapeutic ranges: Procainamide: 4 – 10 µg/mL NAPA: 5 – 30 µg/mL	Test performed on TUE & FRI.	Note: Procainamide and NAPA are always performed together.
Progesterone Receptors Method: RIA	1 gram of tumor tissue (minimum 500 mg); freeze specimen immediately after removal. Send FROZEN Please quote relevant clinical data.	<10 fmol/mg (negative) 11-20 fmol/mg (borderline) 21-100 fmol/mg (positive) >20 fmol/mg (high positive)	Test performed once weekly.	This test is always performed with Estrogen receptors.
Prostatic Acid Phosphatase (PAP Immunoassay) Method: TRACE	1 mL serum FROZEN	<3.0 ng/mL	Test performed daily except MON.	Normal values do not definitely exclude a carcinoma.
Prostatic Specific Antigen Structure Method: LIA	1 mL serum FROZEN	<u>Total PSA:</u> <4.0 ng/mL (for 99% of healthy men); borderline: 3-10 ng/mL <u>Free PSA – PSA Ratio:</u> Ratio <0.15 - higher probability of prostate cancer Ratio >0.25 - higher probability of benign prostate hyperplasia Ratio 0.15-0.25 - control analysis suggested	Test performed daily.	By borderline total PSA results, Free PSA is automatically performed and charged for. Total PSA concentrations of <3 ng/mL and 10-20 ng/mL allow only a limited diagnostic interpretation of the ratio Free PSA/Total PSA.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Protein C (Activity) Method: chromogenic assay	1 mL citrate plasma FROZEN Centrifuge immediately and freeze plasma at -20° C.	Newborn: 17-53% Adult values reached after 6 months of age Adults: >70%	Test performed twice weekly.	The parallel analysis of Factor 8 (activity) is recommended. High factor VIII values may cause a falsely low result of protein C activity. If the patient is on Coumarin this should be stopped for approx. 6-8 weeks before sample is drawn and sent. Heparin does not interfere. In case the risk of a recurrent thrombosis is too high when withdrawing Coumadin, an overlapping treatment with heparin may be considered. Protein C is stable at room temperature for only a few hours (max. 4 hrs). If the citrate blood is not centrifuged immediately and frozen at -20 degrees C, there is a strong decrease in the activity. For this reason, for the diagnosis of "hereditary protein C or S defect", two specimens on two different days for two analyses are recommended. Furthermore, to confirm the diagnosis of a protein C deficiency, the parallel analysis of factor II and factor X is recommended. In case the ratio of factor II and factor X is below 0.5, the result supports the suspicion of a protein C deficiency. <u>Always send separate samples for this test.</u>

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Protein S (Activity) Method: clotting test	1 mL citrate plasma FROZEN Centrifuge immediately and freeze plasma at -20° C.	Newborn 12-60% Adult values reached after 6 months of age Female > 50% Male > 65%	Test performed twice weekly.	If the patient is on Coumarin, this should be stopped approx. 6-8 weeks before sample is drawn and sent. Heparin does not interfere. In case the risk of a recurrent thrombosis is too high when withdrawing coumadin, an overlapping treatment with heparin may be considered. Protein S is stable at room temperature for only a few hours (max. 4 hours). If the citrate blood is not centrifuged immediately and FROZEN at –20 degrees Celsius , there is a strong decrease in the activity. For this reason, for the diagnosis of hereditary protein S or C defect, two specimens on two different days for two analyses are recommended. Always send a separate sample for this test.
Prothrombin Mutation (Factor II mut.) *See Factor II Molecular Analysis				
Protoporphyrins (F) *See Porphyrins (F)				
PSA *See Prostatic Specific Antigen Structure				
PTH Intact (Total – Whole Molecule) Method: LIA	1 mL serum FROZEN	10-65 pg/mL	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Pyruvate (B)	Request special tubes or mix exactly 2 mL blood with 3 mL 7% perchloric acid immediately after collection, mix well. Centrifuge for 10 minutes and send the supernatant. (minimum: 2.5 mL) REFRIGERATE	<15 yrs: 11-86 mcmol/L >15 yrs: 41-67 mcmol/L	Test performed once weekly.	
Q-Fever (Coxiella Burnetti)	1 mL serum REFRIGERATE	<1:10 – abs not detectable >1:10 – ABS DETECTABLE	Test performed daily.	
Quinidine	1 mL serum REFRIGERATE	Therapeutic range: 2.0 – 5.0 µg/mL	Test performed daily.	
Rabies Abs.	2 mL serum REFRIGERATE	IgG spec abs (ELISA): <0.5 IU/mL – abs not detectable >0.5 IU/mL – abs detectable Neutralization test: Immunity assumed if NT titer >1:16 (corresponds to 0.5 IU/mL)	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
RAST Tests Method: FEIA	3 mL serum REFRIGERATE	kU/L CAP-RAST-class <0.35 0 – negative. Spec. IgE not detectable 0.35 - 0.70 1 - Very low concentration of IgE abs detectable. 0.71 – 3.50 2 - Slightly increased concentration of IgE abs detectable. 3.51 – 17.5 3 - Increased concentration of IgE abs detectable. 17.6 – 50 4 - High concentration of IgE abs detectable. 50.1 –100 5 - Very high concentration of IgE abs detectable. >100 6 - Extremely high concentration of IgE abs detectable.	Test performed daily.	See the Specific Allergen RAST List at the end of this Table.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Renin ILMA	1 mL EDTA plasma Draw and centrifuge cool, freeze immediately, transport FROZEN.	2.4 – 29 mcU/mL in persons on a normal diet having been recumbent for at least 20 – 30 minutes. 3.3 – 41 mcU/mL in persons having been moving in an upright position for at least 15 – 30 minutes. The above values are basal values (i.e., without stimulation). Note: Children's reference ranges available upon request.	Test performed daily.	The specimen should be obtained either at the end of one hour's rest or at the end of four hour's upright/light activity. NOTE: This measurement is a concentration, i.e., it is a direct renin measurement. If a renin activity result is required, please see Renin, Activity in the Quest portion of this manual (see section 26)
Respiratory Syncytial Virus Abs (RSV) CF	1 mL serum REFRIGERATE	< 1:10 titer: abs not detectable 1:10 – 1:20 titer: abs from previous infection > 1:20 titer: suspected fresh infection, control suggested	Test performed once weekly.	
Reticulin IgA & IgG IF	2 mL serum REFRIGERATE	For Both: titer 1:10 – negative	Test performed once weekly.	
Rheumatoid Factor IgA, IgG, IgM ABS Method: ELISA	2 mL serum REFRIGERATE	IgA: <10 ratio IgG: <10 ratio IgM: <20 U/mL	Test performed once weekly.	These tests are always performed together
Salmonella Abs	2 mL serum REFRIGERATE	<1:50 titer no antibodies detected >1:200 titer acute infection suspected	Test performed daily.	Types included: Salmonella typhi OH Salmonella paratyphi A Salmonella paratyphi B Salmonella typhimurium Salmonella enteritidis
Sandfly Fever Virus Abs, IgG & IgM Immunoblot	2 mL serum REFRIGERATE	Not detectable	Test performed weekly.	NOTE: These tests can be requested individually.
Schistosoma *See Bilharzia				

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Selenium (S) Method: AAS	2 mL serum required REFRIGERATE	43 – 143 mcg/mL	Test performed THUR.	
Selenium (U)	10 mL urine from a 24 hour collection. Please state 24 hour urine volume. REFRIGERATE	2 – 31 mcg/L	Test performed every two weeks.	
SHBG (Sex Hormone Binding Globulin) Method: LIA	2 mL serum REFRIGERATE	Male: 13-71 nmol/L Female: 18-114 nmol/L Reference range for Children: <u>Female:</u> 1-7 days: 7.5-35 nmol/L 8-15 days: 10-51 nmol/L 16 days-3 years: 13-97 nmol/L 4-6 years: 42-131 nmol/L 7-8 years: 42-150 nmol/L 9-10 years: 30-178 nmol/L 11 years: 35-158 nmol/L 12 years: 30-144 nmol/L 13 years: 25-160 nmol/L 14 years: 13-135 nmol/L 15 years: 25-155 nmol/L 16 years: 28-165 nmol/L 17 years: 24-129 nmol/L 18-19 years: 26-104 nmol/L Tanner 1: 39-177 nmol/L Tanner 2: 7-107 nmol/L Tanner 3: 28-171 nmol/L Tanner 4: 14-150 nmol/L Tanner 5: 29-161 nmol/L **Males: SEE NEXT PAGE**	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
SHBG (Sex Hormone Binding Globulin) (continued)		Male: 1-7 days: 8.8-51 nmol/L 8-15 days: 13-69 nmol/L 16 days-3 years: 20-114 nmol/L 4-6 years: 34-141 nmol/L 7-8 years: 43-120 nmol/L 9-10 years: 30-169 nmol/L 11 years: 47-154 nmol/L 12 years: 30-174 nmol/L 13 years: 23-159 nmol/L 14 years: 14-101 nmol/L 15 years: 17-143 nmol/L 16 years: 18-113 nmol/L 17 years: 19-78 nmol/L 18-19 years: 19-61 nmol/L Tanner 1: 28-150 nmol/L Tanner 2: 44-160 nmol/L Tanner 3: 5-163 nmol/L Tanner 4: 13-88 nmol/L Tanner 5: 21-71 nmol/L		
Sperm Abs (IgA & IgG) Method: IF	1 mL serum required REFRIGERATE	<1:10 titer	Test performed once weekly.	
Streptococcal Anti DNASE B *See Anti DNASE				
Sulfonylurea Structure Method: GC-spectroscopy	2 x 30 mL urine required REFRIGERATE	Negative	Test performed once weekly.	These tests are not offered individually. Includes: Chlorpropamide, Glibenclamide, Glibornuride, Tolazamide, Tolutamide.
T4 Abs	1 mL serum REFRIGERATE	Not detectable	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
T4 Total (Thyroxin) Method: LIA	1 mL serum (minimum: 0.5 mL sufficient for pediatric sample) REFRIGERATE	Adults: 5-12 µg/dL Reference range for children: Cord blood: 6.7-14 µg/dL 1-3 days: 10.5-21.1 µg/dL 3-30 days: 7.5-16 µg/dL 30-60 days: 7-14.5 µg/dL 2-12 months: 6.6-13.8 µg/dL 1-5 years: 6.5-13 µg/dL 5-10 years: 6.4-12.2 µg/dL 10-20 years: 4.7-11.1 µg/dL	Test performed daily.	
T4 & T8 Lymphocytes (CD3, CD4, and CD8) Method: flow cytometry	5 mL EDTA blood, send immediately and write sampling date on form. ROOM TEMPERATURE Do not store this sample in the refrigerator; keep at room temperature. Draw sample as near to time of dispatch as possible. Do not send at end of week.	Lymphocytes, total: 1575 – 2450/µL T-Lymphocytes (CD3+) total: 1115 - 1710/µL T Lymphocytes (CD3+) % of lymph: 65-80% T-helper cell count (CD3+, CD4+) total: 690-1120/µL T-helper cell count (CD3+, CD4+) % of lymph: 40-50% T-suppressor cell count (CD3+, CD8+) total: 540-925 /µL T-suppressor cell count (CD3+, CD8+) % of lymph: 30-40% CD4/CD8 ratio: 1.0-1.6 Interpretation: See Report	Test performed daily.	Date of birth is imperative. Due to stability, results cannot always be guaranteed from samples received from outside Germany.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
T&B Lymphocyte Differentiation (Lymphocytes total, CD3, CD4, CD8, CD16/CD56, CD19) Method: Flow Cytometry	5 mL EDTA blood, send immediately and write sampling date on form. ROOM TEMPERATURE Do not store this sample in the refrigerator; keep at room temperature. Draw sample as near to time of dispatch as possible. Do not send at end of week.	Lymphocytes, total: 1575-2450 /µL T-lymphocytes (CD3+) total: 1115 - 1710 /µL T-lymphocytes (CD3+) % of lymph: 65-80% T-helper cell count (CD3+CD4+) total: 690-1120 /µL T-helper cell count (CD3+CD4+) % of lymph: 40-50% T-suppressor cell count (CD3+CD8+) total: 540-925 /µL T-suppressor cell count (CD3+CD8+) % of lymph: 30-40% B lymph (CD19+) total: 210-305 /µL B lymph (CD19+) %of lymph: 10 - 15% NK-cell-count (CD16+/CD56+) total: 180-350 /µL NK-cell-count (CD16+/CD56+) % of lymph: 10-15% CD4/CD8 Ratio: 1.0-1.6 Interpretation: See Report	Test performed daily.	Date of birth is imperative. Due to stability, results can not always be guaranteed from samples received from outside Germany.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Tacrolimus (FK 506) Method: MEIA	1 mL EDTA blood REFRIGERATE	2 – 15 ng/mL, depending on clinical picture: < 20 ng/L	Test performed daily.	
Testosterone Free *See Free Testosterone				
Tetanus IgG SPEC. ABS Method: EIA	1 mL serum REFRIGERATE	<0.1 IU/mL: immunity questionable; dependent on medical history, immunization or booster recommended 0.11-0.50 IU/mL: immunity present at the moment, booster would give long-term immunity 0.51-1.0 IU /mL: immunity present; booster recommended in 2-5 years 1.1-5.0 IU/mL: immunity present, booster recommended in 5-10 years >5.0 IU/mL: immunity present; booster recommended at the earliest in approx. 10 years	Test performed two-three times a week.	
Thallium (B) Method: AAS	10 mL heparin blood REFRIGERATE	<5 mcg/L	Test performed weekly.	
Thrombin Time (TT)	3 mL citrate plasma FROZEN	14-21 sec.	Test performed daily.	
Thyreoglobulin Method: ILMA	2 mL serum REFRIGERATE	2-70 ng/mL After thyroidectomy and radioiodine therapy: <1 ng/mL 1-2 ng/mL - borderline >2 ng/mL – pathological	Test performed MON, WED, & FRI.	For interpretation of a thyreoglobulin value following thyroidectomy, the progress of the thyreoglobulin results must be taken into consideration. Each increase can indicate a recurring tumor.
Thyroxine *See T4				

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Tick-Borne Encephalitis (TBE) IgG & IgM ABS Method: EIA	1 mL serum REFRIGERATE	IgG: <7 U/mL – not detectable IgM: not detectable	Test performed twice weekly.	
Tobramycin FPIA	1 mL serum REFRIGERATE	Therapeutic Range (sampling 1 hour after i.m. or i.v. dosage): 5 – 12 µg/mL	Test performed daily.	
Toxoplasmosis DNA PCR	2 mL CSF or 7 mL EDTA blood Special monovettes or vacutainers must be used, NOT normal EDTA tubes. Use Bioscientia's tubes. DO NOT centrifuge and DO NOT take aliquots for other analyses. Please send only unopened tubes.	Negative	Test performed once weekly.	
Transferrin Method: nephelometric	1 mL serum REFRIGERATE	2.0 – 3.6 g/L	Test performed daily.	
Trazodone Method: HPLC	2 mL serum REFRIGERATE	Therapeutic range: 0.3 - 2.5 mcg/mL	Test performed twice weekly.	
Trichinosis Abs IgG Spec ABS Method: EIT	3 mL serum REFRIGERATE	<4 MONA	Test performed once weekly.	Trichinosis Western blot IgG and IgM are automatically performed and charged for, if positive EIT result obtained.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Troponin I Method: CLIA	1 mL serum REFRIGERATE	<0.1 ng/mL – no indication of myocardial damage. If clinical symptoms indicate, however, suggest control analysis (highest value approx. 12-24 hours after infarct; increased value lasts approx. 5-10 days). 0.1-1.0 ng/mL – unstable angina pectoris; commencing myocardial infarction; minor myocardial damage, viral-caused myocardial damage >1.0 ng/mL – indicates myocardial damage	Test performed daily.	
Trypanosoma-Crucei Abs (CHAGAS) Method: IHA, IgG & IgM: IF	2 mL serum REFRIGERATE	IHA: negative IgG spec. abs: <1:40 titer - abs not detectable IgM spec. abs: <1:20 titer - abs not detectable	Test performed once weekly.	Results ready in one-two weeks
Tryptase Method: RIA	2 mL serum REFRIGERATE	Mean value: 5.6 mcg/L 90 percentile: 9.8 mcg/L 95 percentile: 13.5 mcg/L	Test performed once weekly.	
TSH Receptor ABS Method: coated tube luminescence receptor assay	1 mL serum REFRIGERATE	<1 IU/L – abs not detectable 1-2 IU/L – borderline >2 IU/L – abs detectable	Test performed daily.	
Tubular Basal Membrane ABS *See Basal Membrane ABS				
Tularaemia IgG & IgM Abs (Francisella Tularensis)	2 mL serum REFRIGERATE	IgG spec. abs: < 1:40 – abs not detectable IgM spec. abs: < 1:20 – abs not detectable	Test performed once weekly.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Uroporphyrinogen-1-Synthase	2 mL EDTA or 2 mL heparin blood REFRIGERATE	7.30-15.8 nMol/sec/L Hematocrit: Female: 0.37-0.47 L/L Male: 0.42-0.52 L/L Infants: 0.33-0.40 L/L Children 2-6 years: 0.34-0.41 L/L	Test performed once weekly.	
Uroporphyrins (F) *See Porphyrins (F)				
Uroporphyrins (U) ***See Porphyrins (U)				
Vanillylmandelic Acid *See VMA				
VIP (Vasoactive Intestinal Polypeptide) Method: RIA	2 mL EDTA plasma + 0.1 mL Trasylol, FROZEN	<63 pg/mL	Test performed monthly.	Always send a separate sample for this test. Results ready two weeks later.
Viscosity Method: manual	3 mL citrate plasma REFRIGERATE	1.14 – 1.34 milli Pascal sec	Test performed once weekly.	
Vitamin A (Retinol) Method: HPLC	1 mL serum (protect from light) REFRIGERATE	300-800 ng/mL	Test performed twice weekly.	
Vitamin B1 (Thiamine) Method: HPLC	5 mL FROZEN heparin or 5 mL FROZEN EDTA blood FROZEN	16 – 48 ng/mL	Test performed MONDAYS.	
Vitamin B2 (FAD)	2–5 mL EDTA or heparin blood; protect from light; keep at ROOM TEMPERATURE	125 – 300 ng/mL	Test performed once weekly.	
Vitamin B6 (Pyridoxal Phosphate) Method: REA	3 mL EDTA plasma, SEND IMMEDIATELY Light protected or FROZEN	3.6 – 18.0 ng/ mL	Test performed daily.	
Vitamin D (1,25 Dihydroxycholicalciferol) Method: RIA	3 mL serum; freeze and SEND FROZEN	17-53 pg/mL children up to 12 years: up to 40% higher values In pregnancy (8th - 42nd week) up to 60% higher values Adults over 70 years up to 40% lower values	Test performed TUE & THUR.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Vitamin D (25-Hydroxy-Cholecalciferol) Method: ILMA	1 mL serum REFRIGERATE	10-68 ng/mL	Test performed daily.	
Vitamin E (Alpha Tocopherol) Method: HPLC	1 mL serum REFRIGERATE	5-18 µg/mL	Test performed twice weekly.	
Vitamin K 1 Method: HPLC	2 mL serum (protect from light) REFRIGERATE	500 – 900 ng/L	Test performed once weekly.	Always send a separate sample for this test.
VLDL Cholesterol (P,S) Method: calculation	1 mL serum SEND IMMEDIATELY REFRIGERATE	<30 mg/dL	Test performed daily.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
VLFA (Very Long Chain Fatty Acids)	3 mL serum REFRIGERATE Specimen must be taken under fasting conditions and the person taking the blood and patient should not use hand cream of any sort.	Fatty acid C22: <1 year: 21.1-102.8 µmol/L 1-9 years: 33.2-96.3 µmol/L >10 years: 30.5-97.7 µmol/l Fatty acid C24: <1 year: 22.2-86.5 µmol/L 1-9 years: 25.2-71.4 µmol/L >10 years: 24.4-65.9 µmol/L Fatty acid C26: <1 year: 0.05-1.97 µmol/L 1-9 years: 0.23-1.79 µmol/L >10 years: 0.15-0.91 µmol/L C24/C22 ratio: <1 year: 0-1.15 ratio 1-9 years: 0-1.101 ratio >10 years: 0-0.96 ratio C26/C22 ratio: <1 year: 0-0.028 ratio 1-9 years: 0-0.026 ratio >10 years: 0-0.022 ratio Phytanate (Phytanic acid) <1 year: 0-10 µmol/L 1-9 years: 0-15 µmol/L >10 years: 0-15 µmol/L Pristanate: <1 year: 0-1 µmol/L 1-9 years: 0-2 µmol/L >10 years: 0-2 µmol/L Interpretation: See Report	Test performed once weekly.	Quote patient's race, sex and age and whether samples are from relatives of patients with adrenoleukodystrophy/ adrenomyeloneuropathy or from patients with these diseases who are being treated with Lorenzo's Oil. It is imperative that clinical data and date of birth (not just age) is always quoted.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
VMA Method: HPLC	2 X 30 mL of a 24 hour urine collection. REFRIGERATE Immediately after collection, mix the 24 hr. urine well. Please state 24 hr. urine volume. Prepare the shipping tube to contain 0.5 mL of 25% hydrochloric acid, fill tube with urine and mix well. Ensure pH value between 2-4. Do not use acetic acid or boric acid.	<2 years old: <2.4 mg/24 hour <8 years old: <3.7 mg/24 hour <16 years old: <5.0 mg/24 hour >16 years old: <7.2 mg/24 hour	Test performed daily.	DIET: It is recommended that the patient has no intake for 2 days prior to collection of the specimen of the following: nuts, citrus fruits, cocoa, coffee, or vanilla containing products. MEDICATION: If clinical condition allows, it is also recommended that the patient stops taking catecholamines, MAO inhibitors or catecholamine reuptake inhibitors at least 2 days prior to sampling. Catecholamines, Homovanillic acid and Metanephrines can also be performed in these specimens.
Von Willebrand Factor Panel				If only this is written, factor VIII activity, factor VIII associated antigen, and factor VIII ristocetin cofactor will be performed and charged for.
Xylose Method: Photometric	2 x 2 mL serum. Send in NaF tubes. Protect from light. Adults: oral application of 25 g D-Xylose. Collect two specimens – one before the oral dose and one between 90 – 120 minutes after oral dose. Children: oral application of 15 g D-Xylose/m^2 body surface. Collect two specimens – one before the oral dose and one 60 min after oral dose. REFRIGERATE.	See Report for details.	Test performed MON, WED, & FRI.	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Yersinia IgA & IgG Abs EIA	1 mL serum REFRIGERATE	For Both: < 20 U/mL – abs not detectable 20 - 24 U/mL – borderline > 24 U/mL – abs detectable	Test performed daily.	NOTE: Yersinia Immunoblot IgA and IgG will automatically be performed and charged for on all positive Yersinia results.
Zinc (S) Method: AAS	1mL serum REFRIGERATE	55 – 150 mcg/dL	Test performed daily.	
Zinc Protoporphyrins Method: fluorometry	3 mL EDTA blood REFRIGERATE	< 40 mcmol/Mol Heme	Test performed once weekly.	

RAST MIX LIST:

Aspergillus mix – MX10
M207 Aspergillus niger
M3 aspergillus fumigatus

ATOPY PANEL 20
includes Aspergillus spec., Cladosp. herbarum, apple, carrot, cod (fish), egg white, milk, peanut, potato, rice, Soya-bean, wheat, birch, mugwort, timothy grass, horse, dog, cat, house dust mite dermatophagoides pteronyssinus, house dust mite dermatophagoides. See test name for requirement, reference range and turnaround time.

Baby Food Mix - FX5
F1 egg white
F2 milk
F3 fish (cod)
F4 wheat (flour)
F13 peanut
F14 soya bean

Chemicals mix - PAX5
K75 isocyanat TDI
K76 isocyanat MDI
K77 isocyanat HDI
K79 phthalic acid anhydride

Citrus mix – FX92
F33 Orange
F208 lemon
F209 grapefruit
F302 Mandarine/Clementine

Disinfectant mix - PAX6
K78 ethylene oxide
K79 phthalic acid anhydride
K80 formaldehyde
K85 chloramine T

Epithelial mix - EX1
E1 cat dander
E3 horse dander
E4 cow dander
E5 dog dander

Epithelial mix - EX2
E1 cat dander
E5 dog dander
E6 guinea pig epithelium
E87 rat epithelium and serum protein
E88 mouse epithelium and serum protein

Epithelial and feather mix - PAX1
E3 horse dander
E4 cow dander
E70 goose feathers
E85 chicken feathers

Feather mix - EX71
E70 goose feathers
E85 chicken feathers
E86 duck feathers
E89 turkey feathers

Feather mix - EX73
E70 goose feathers
E85 chicken feathers
E86 duck feathers
E213 parrot feathers

Food mix 1 - FX7
F 25 tomato
F 45 yeast
F 47 garlic
F 48 onion
F 85 celery

Food mix 2 - FX8
F17 hazel nut
F18 brazil nut
F33 orange
F49 green apple
F93 cocoa

Food mix 3 - FX9
F 20 almond
F 84 kiwi fruit
F 87 melon
F 92 banana
F259 grape

Food mix 4 - FX10
F26 pork
F27 beef
F75 egg yolk
F83 chicken meat
F284 turkey meat

Food mix 5 - FX11
F8 maize
F12 pea
F15 white bean
F31 carrot
F260 broccoli

Food mix 6 - FX12
F5 rye
F9 rice
F35 potato
F212 mushroom
F225 pumpkin

Food mix 7 - FX18
F12 pea
F13 peanut
F14 soya bean

Food mix 8 - FX19
F31 carrot
F35 potato
F214 spinach
F244 cucumber

Food mix 9 - FX20
F4 wheat
F5 rye
F6 barley
F9 rice

Food mix FX26 – FX26
F1 egg white (chicken egg)
F2 milk (protein)
F13 peanut
F89 mustard

Food mix Fx27 – FX27
F3 fish (cod)
F4 wheat
F14 Soya Bean
F17 hazel nut

Food mix Fx28 – FX28
F10 sesame seed
F24 shrimp
F27 beef
F84 kiwi fruit

FOOD PANEL 20
includes almond, hazelnut, peanut, walnut, sesame, Soya bean, rye flour, wheat flour, carrot, celery, potato, tomato, apple, peach, casein, milk, egg white, egg yolk, cod (fish), crab
See test name for requirement, reference range and turnaround time.

Fruit mix (Latex assoc.) – Fx91
F84 Kiwi fruit
F91 Mango
F92 Banana
F293 Papaya
F96 Avocado

Fruit mix 1 - FX15
F33 orange
F49 green apple
F92 banana
F95 peach

Fruit mix 2 - FX16
F44 strawberry
F94 pear
F208 lemon
F210 pineapple

Fruit mix 3 - FX17
F49 green apple
F92 banana
F94 pear
F95 peach

Fruit mix 4 - FX21
F84 kiwi fruit
F87 melon
F92 banana
F95 peach
F210 pineapple

Fruit mix (birch pollen assoc.) – FX90
F49 apple
F94 pear
F95 cherry
F242 plum
F255 peach

Grain mix - FX3
F4 wheat
F7 oat
F8 maize
F10 sesame seed
F11 buckwheat

Grass mix, early bloom - GX1
G3 cocksfoot
G4 meadow fescue
G5 rye-grass
G6 Timothy grass
G8 meadow grass

Grass mix - GX2
G2 Bermuda grass
G5 rye grass
G6 Timothy grass
G8 meadow grass

G10 Johnson grass
G17 Bahia grass

Grass mix - GX3
G1 sweet vernal grass
G5 rye grass
G6 Timothy grass
G12 cultivated rye
G13 velvet grass

Grass mix, late bloom - GX4
G1 sweet vernal grass
G5 rye grass
G7 common reed
G12 cultivated rye
G13 velvet grass

Grass mix 3 – GX6
G2 Bermuda grass
G5 rye grass
G10 Johnson grass
G11 brome grass
G13 velvet grass
G17 Bahia grass

Herb mix - WX1
W1 common ragweed
W6 mugwort
W9 plaintain / ribwort
W10 goosefoot/Lamb's quarters
W11 saltwort (prickly)

Herb mix - WX2
W2 western ragweed
W6 mugwort
W9 plaintain / ribwort
W10 goosefoot/Lamb's quarters
W15 scale, lenscale

Herb mix - WX3
W6 mugwort
W9 plaintain / ribwort
W10 goosefoot/Lamb's quarters
W12 golden rod

Herb mix - WX5
W1 common ragweed
W6 mugwort
W7 marguerite, ox-eye daisy
W8 dandelion
W12 golden rod

Herb mix - WX6
W9 plaintain / ribwort
W10 goosefoot/Lamb's quarters
W11 saltwort (prickly)
W18 sheep sorrel

Herb mix - WX7
W7 marguerite, ox-eye daisy
W8 dandelion
W9 plaintain / ribwort
W10 goosefoot/Lamb's quarters
W12 golden rod

Inhalant Allergens – SX1
D1 dermatophagoides pteronyssinus
E1 cat dander
E5 dog dander
G6 Timothy grass
G12 cultivated rye
M2 cladosporium herharum (hormodendrum)
T3 common silver birch
W6 mugwort

INHALATION PANEL 20
Includes alder, birch, hazel pollen, grass mix, rye pollen, plantain pollen, mugwort, house dust mite dermatophagoides farinae, house dust mite dermatophagoides pteronyssinus, cat, dog, guinea pig, hamster, horse, rabbit, feather mix, altenaria tenuis, aspergillus spec., cladosp. Herbarum, penicillium notatum
See test name for requirement, reference range and turnaround time

Meat mix - FX73
F26 pork
F27 beef
F83 chicken

Mite and insect mix - PAX2
D70 storage mite (acarus sivo)
D71 storage mite (lepidoglyphus destructor)
I201 horsefly
I202 weevil

Mite mix - HX2
H2 Hollister-Stier labs
D1 dermatophagoides pteronyssinus
D2 dermatophagoides farinae
I6 cockroach

Mould mix - MX1
M1 penicillium notatum
M2 cladosporium herbarum
M3 aspergillus fumigatus
M6 alternaria tenuis

Mould mix – MX2
M1 penicillium notatum
M2 cladosporium herbarum
M3 aspergillus fumigatus
M5 candida albicans (yeast)
M6 alternaria tenuis
M8 helminthosporium haloties

Nut mix - FX1
F13 peanut
F17 hazel nut
F18 brazil nut
F20 almond
F36 coconut

Nut mix 2 – FX22
F201 Pecan, nut
F202 Cashew nut
F203 Pistachio
F256 Walnut (fruit)

Perennial mix – RX2
D2 house dust mite (farinae)
E1 cat dander
E3 horse dander
M6 alternaria tenuis

Pollen and mould mix - PAX3
M3 aspergillus fumigatus
M6 alternaria tenuis
G12 cultivated rye
G15 cultivated wheat

Pollen mix 1 - RX1
G6 Timothy grass
W6 mugwort
W9 plaintain / ribwort
W21 wall pellitory (parietaria judaica)

Pollen mix 2 – RX3
G2 bermuda grass
G5 rye grass
G17 bahia grass
W1 common ragweed
W9 plaintain / ribwort
W10 goosefoot, Lamb's quarters

Pollen mix 3 – RX4
G2 bermuda grass
G5 rye grass
G11 brome grass
W1 common ragweed
W6 mugwort
W9 plaintain / ribwort

Rodent mix - EX70
E6 guinea pig epithelium
E7 pigeon droppings
E73 rat epithelium
E82 rabbit epithelium
E84 hamster epithelium

Sea food mix - FX2
F3 fish (cod)
F24 shrimp
F37 blue mussel
F40 tuna fish
F41 salmon

Sea food mix - FX74
F3 cod
F205 herring
F206 mackerel
F254 plaice

Spice mix - FX70
F272 tarragon
F273 thyme
F274 marjoram
F275 lovage

Spice mix - FX71
F265 caraway
F266 mace
F267 cardamom
F268 clove

Spice mix - FX72
F219 fennel seed
F269 basil
F270 ginger
F271 aniseed

Tree mix - TX1
T1 box elder
T3 common sliver birch
T8 elm
T10 walnut

Tree mix - TX2
T1 box elder
T7 oak
T8 elm
T14 cottonwood
T22 pecan, hickory

Tree mix - TX3
T6 mountain juniper
T7 oak
T8 elm
T14 cottonwood
T20 mesquite

Tree mix - TX4
T7 oak
T8 elm
T11 plane
T12 willow
T14 cottonwood

Tree mix, early bloom - TX5
T2 grey elder
T4 hazel
T8 elm
T12 willow
T14 cottonwood

Tree mix, late bloom - TX6
T1 maple
T3 common silver birch
T5 American beech
T7 oak
T10 walnut

Tree mix - TX7
T9 olive
T12 willow
T18 eucalyptus / gum tree
T19 acacia
T21 cajeput-tree, melalenca

Tree mix - TX8
T1 maple
T3 common silver birch
T4 hazel
T11 plane

Tree mix - TX9
T2 grey elder
T3 common silver birch
T4 hazel
T7 oak
T12 willow

Tree mix 10 - TX10
T2 grey elder
T3 common silver birch
T4 hazel
T15 white ash

Vegetables mix 1 - FX13
F12 pea
F15 white bean
F31 carrot
F35 potato

Vegetables mix 2 - FX14
F25 tomato
F214 spinach
F216 cabbage
F218 paprika/sweet pepper

22. **BROOKE ARMY MEDICAL CENTER (BAMC)**

General Information:

(1) Address: Brooke Army Medical Center
Reference Chemistry, MCHE-PL
3851 Roger Brooke Dr., Room 429-9
Fort Sam Houston, TX 78234-6200

(2) Telephone: (210) 916-2120/6813 Fax: (210) 916-7814
DSN: 429-1448

(3) POC: Sartori, Cindy
e-mail: Cynthia.Sartori@cen.amedd.army.mil

(4) Website: http://www.bamc.amedd.army.mil/path.htm

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Lead	3 mL EDTA tube or Capillary tube (pediatric) 7 mL EDTA tube (adult) REFRIGERATE	=9 µg/dL Normal 10-14 µg/dL - Border zone, rescreen in 3 months 15-19 µg/dL - Careful follow-up indicated. Retest every 3 months. 20-44 µg/dL - Conduct a complete medical evaluation. 45-69 µg/dL - Begin medical treatment, environmental assessment, and remediation within 48 hrs =70 µg/dL - Begin medical treatment, environmental assessment, and remediation immediately	2 weeks	

23. **CENTER FOR HEALTH PROMOTION AND PREVENTATIVE MEDICINE (CHPPM-MAIN), ABERDEEN PROVING GROUND**

General Information:

(1) Address: U.S. Army CHPPM
ATTN: MCHB-DC-LLI/Sample Management
5158 Blackhawk Road Bldg E2100
Aberdeen Proving Ground, MD 21010

(2) Phone: (410) 436-3983

(3) POC: Ronal.Swatski@apg.amedd.army.mil

(4) Webpages of interest.

(a) For further information on Depleted Uranium please visit the webpages below.

http://chppm-www.apgea.army.mil/documents/FACT/65-050-0503.pdf

http://chppm-www.apgea.army.mil/usachppmresources/DepletedUraniumTwoPagesFinalVersionWPI.pdf

(b) To view the most recent (JAN 2004) OTSG Depleted Uranium (DU) Policy and to determine exposure level please follow this link.

http://www.pdhealth.mil/downloads/DU_Policy.pdf

(c) CHPPM-MAIN website: http://chppm-www.apgea.army.mil/

(d) Department of Veterans Affairs website for download of Department of Veterans Affairs (DVA) Depleted Uranium Questionnaire (10-9009d) and DVA Specimen Tracking Form (10-9009f). Type 'depleted uranium' in the SEARCH keywords field to pull up the forms. http://www.va.gov/vaforms/

(5) Guidance for ordering a Depleted Uranium Urine Test.

(a) Ordering information for a patient **at a deployment/downrange location (i.e., use the Screening Test ONLY in a deployed environment when logistical and operational constraints do not permit a 24-hour urine specimen collection)**:

[1] Please order a DEPLETED URANIUM SCREENING TEST and a URINE CREATININE for every specimen.

[2] The minimum volume needed is 120mL. Collect specimen in a suitable plastic bottle with a leaf-proof cap. **Ideally, urine specimen collection cups (with yellow or blue lids) should not be used to ship urine specimens. Instead, the urine specimen collection should be transferred to a urine container that is sturdy (one that has a metal or hard-plastic screw-top lid) such as NSN # 6640-00-165-5778.**

[3] Forward the DU urine specimen and a completed SF557 FORM to the LRMC DPALS Central Processing Section (486-7494). Annotate the patient's age, sex, height, weight, and preliminary exposure level (l, ll, or lll) on the SF557.

(b) In-patients or patients drawn in garrison locations in Europe, **to include post-deployment processing**:

[1] Submit a 24-hour urine specimen.

[2] Order a URINE CREATININE for the specimen.

[3] Forward a completed Department of Veterans Affairs (DVA) DU Questionnaire [Annex 4 of the 13 January 2004 OTSG/MEDCOM Policy Memo 03-007, Subject: Medical Management of Army Personnel Exposed to Depleted Uranium (DU); the original of the form is placed in the patient's medical record and a copy of the form is submitted with the 24-hour urine specimen), DVA Specimen Tracking Form, and a completed SF557 FORM with the specimen to the LRMC DPALS Central Processing Section. Annotate the patient's age, sex, height, weight, and preliminary exposure level (l, ll, or lll) on the SF557.

(6) Metal fragments removed from Level l patients will be considered as clinical laboratory specimens. A completed SF557 FORM with the ordering physician's contact information and a copy of the completed DVA DU Questionnaire (the original of the form is placed in the patient's medical record and a copy of the form is submitted with the specimen)and DVA Specimen Tracking form must be submitted with the metal fragment.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Depleted Uranium (Metal Fragments Suspected to be DU)	Metal fragment(s) removed from Level l exposure patient.	See Report	2 weeks	A completed SF557 FORM with the ordering physician's contact information and a copy of the completed DVA DU Questionnaire and DVA Specimen Tracking Form must be submitted with the specimen.
Uranium Bioassay	24 hr urine	See Report	2 weeks	Urine Creatinine to be performed at LRMC must be ordered with this test – annotate patient's age, sex, height, and weight on the SF557 FORM. Submit SF557 FORM, DVA Specimen Tracking Form, and a copy of the completed DVA DU Questionnaire with the specimen.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Uranium Screening Test	150 mL Urine Collect in a suitable plastic bottle with a leak-proof cap. The urine specimen collection should be transferred to a urine container that is sturdy (one that has a metal or hard-plastic screw-top lid) such as NSN # 6640-00-165-5778.	None detected	2 weeks	**TO BE USED ONLY BY DOWNRANGE SUBMITTING SITES WHERE THE COLLECTION OF A 24-HOUR URINE SPECIMEN COLLECTION IS NOT FEASIBLE.** Urine Creatinine to be performed at LRMC must be ordered with this test – annotate patient's age, sex, height, and weight on the SF557 FORM. Submit SF557 FORM with the specimen.

24. **MARYLAND DEPARTMENT OF HEALTH AND MENTAL HYGIENE (MDHMH)**

General Information – Neonatal Screening Program:

(1) The Maryland Department of Health and Mental Hygiene is used only for neonatal screening.

(2) Address: Maryland State Department of Health and Mental Hygiene
Neonatal Screening Laboratory
201 West Preston Street Room 4 D7
Baltimore, MD 21201
ATTN: Linda Corcoran

(3) Telephone: (410) 767-6100/6099

(4) E-mail: corcoranl@dhmh.state.md.us

(5) Website: http://www.dhmh.state.md.us/labs/pdf/guide702.pdf

(a) Clinical Significance: The neonatal screening program (also referred to as PKU) is a vital program that screens infants for Phenylketonuria, Maple Syrup Urine Disease, Galactosemia, Biotinidase, Homocystinuria, Tyrosinemia, Congenital Hypothyroidism and hemoglobinopathies. This testing is vital because these diseases can result in serious abnormalities, including retardation, if not diagnosed and treated very early in life.

(b) Principles of the Procedure:

[1] Dried blood spot specimens are clinical specimens collected by carefully applying a few drops of blood, freshly drawn by heel stick with a lancet, onto specially manufactured absorbent specimen collection paper. The blood is allowed to thoroughly saturate the paper and is air dried before testing can be performed.

[2] The blood screening test for PKU (phenylketonuria), Leucine (Maple syrup urine disease), Methionine (Homocystinuria), and Tyrosine (Tyrosinemia) utilizes bacterial growth to determine the presence or absence of phenylalanine in the blood. The blood impregnated filter paper disks are placed on culture media containing bacteria and the media is then observed for bacterial growth. Because testing is based on bacterial growth, it is imperative that specimen collection be performed in a sterile manner and that the spotted blood be allowed to thoroughly dry on the filter paper before the specimen card is packaged for shipment.

(c) Cautions:

[1] Standard (Universal) precautions should always be used when collecting a patient specimen. Wear gloves when collecting specimens and exercise caution when handling used lancets. Always dispose of lancets in an approved sharps container.

[2] The presence of an infectious agent in a dried blood spot specimen would be rare. If a blood specimen that is absorbed and dried into the filter paper matrix did contain human immunodeficiency virus (HIV), the viral agent would be destroyed as the specimen was dried.

[3] Hepatitis B virus (HBV) may survive for an extended period of time in dried blood, however, HBV is not readily transmissible when in the dried state.

(d) Reagents and Equipment:

[1] Sterile lancet device (The lancet should be of proper pediatric size, making an incision that is less than 2.4 mm deep. The standard size lancet makes an incision 1.0 mm in depth. Lancets can be obtained in different calibrations for infants, premature infants, and toddlers).

[2] Alcohol pads

[3] Sterile Gauze

[4] Heparinized capillary collection tubes (if preferred)

[5] Disposable gloves

(e) Procedure:

[1] Obtain the proper collection card.

[a] DHMH #77 (five-circle card) is used for initial newborn specimens collected not sooner than 24 hours after the onset of milk feeding.

[b] Avoid handling the blood collection card at the collection spots since skin oils may alter absorption of blood.

[c] To protect against infectious disease, don gloves before collecting specimens.

[2] Special considerations:

[a] When holding the infant's foot, be firm but gentle. A premature infant, in particular, has delicate tissue that may bruise easily. Holding the foot too tightly also restricts blood flow.

[b] Avoid excessive milking or squeezing of the foot as it may cause hemolysis and dilutes the blood with interstitial and intracellular fluid.

[c] Avoid covering puncture sites with adhesive bandages because newborn skin is fragile and may macerate under the bandage.

[d] Direct application of blood from the heel to the card is the technique of choice, however, blood from a capillary tube may be applied if care is taken not to scratch or dent the filter paper and to avoid the application of excess blood to the filter paper.

(f) Collection:

[1] Identify the patient.

[2] Ensure that all information is properly recorded on the PKU card. (see example of the card at the end of this section).

[3] Inspect the heel for proper warmth. If the skin covering the heel is cool, pre-warm the foot with a chemical pack made especially for this purpose or a warm wet towel. APPROPRIATE CARE MUST BE TAKEN TO ENSURE THE INFANT IS NOT INJURED DURING THE WARMING PROCEDURE BY THE USE OF EXCESSIVELY WARM/HOT ITEMS.

[4] Locate the proper portion of the heel to be used for the heel stick (see illustration provided at the end of this section).

[5] Disinfect the side of the heel with the alcohol swabs.

[6] Wipe the area with sterile cotton or gauze to ensure that the area is completely dry.

[7] Hold the infant's heel with your non-dominant hand. Your forefinger (pointer finger) should cross the arch on the sole of the patient's foot and the thumb should support the patient's heel.

[8] Using the dominant hand, hold the lancing device perpendicular to the heel. (The depth of the lancing device should not exceed 2.4 mm).

[9] Pierce the skin with the lancet.

[10] Wipe away the first drop of blood using a sterile gauze pad. (This first drop of blood will contain excess tissue fluid).

[11] Allow a LARGE drop of blood to collect at the puncture site.

[12] Place the preprinted circle of the filter paper on the blood drop so that the blood completely fills the preprinted circle AND soaks through to the back of the filter paper. (See example at the end of this section.)

[13] Do not touch or press the filter paper against the heel. Testing cannot be performed if the filter paper is disturbed.

[14] Repeat for all circles. Gentle pressure with the forefinger may facilitate the blood flow. Milking the area is not recommended as it causes hemolysis and/or dilution of the specimen with tissue fluid.

[15] Dispose of the lancet in an approved sharps container.

[16] Place a sterile gauze pad over the puncture site and apply pressure until the bleeding stops. Do not use an adhesive strip for the reasons mentioned above.

(g) Transport to DPALS.

[1] Allow the blood spots to air dry completely at room temperature (a minimum of 4 hours). Specimens must be completely dry before shipping. Do NOT expose specimen to direct heat.

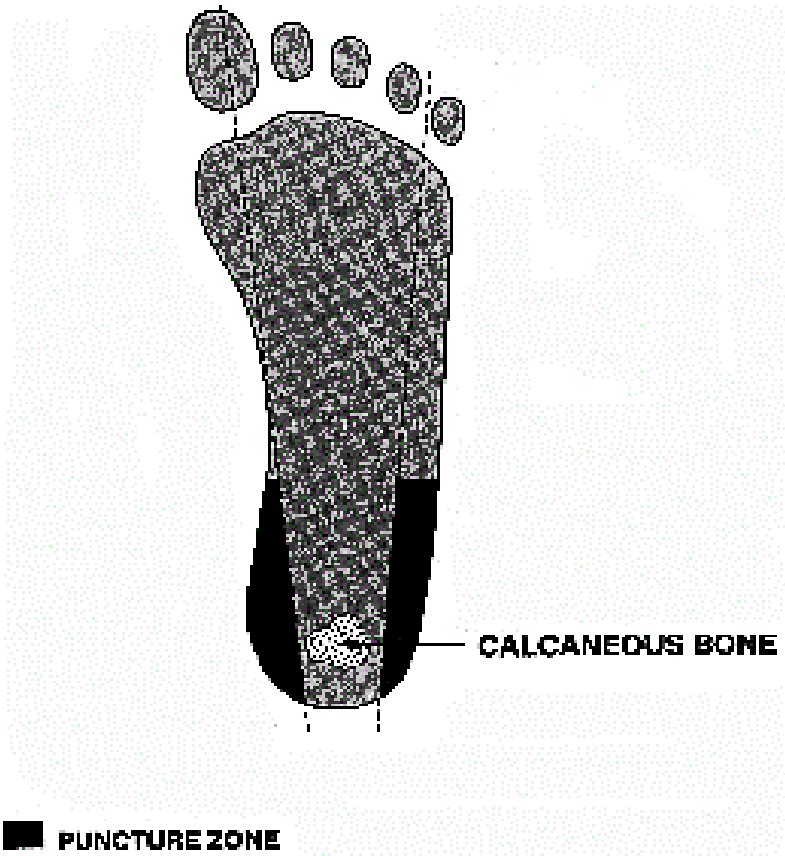
[2] The specimen should not be packaged in air tight plastic bags because heat may build up in the bag, causing moisture accumulation that can damage the dried blood spots. Instead, place the PKU card in a dry envelope. Ideally, an extra-strong, tear-proof, air-permeable, and water-resistant envelope should be used to provide reasonable safety from occupational exposure and maintain optimal specimen integrity.

[3] If shipping from an outlying health clinic, one large preprinted CHCS label should be placed on the front of the PKU card and one of the medium-sized labels should be placed on the second page to ensure proper identification of the specimen. Send all extra labels and the CHCS generated transmittal list with the specimen to DPALS, Central Processing.

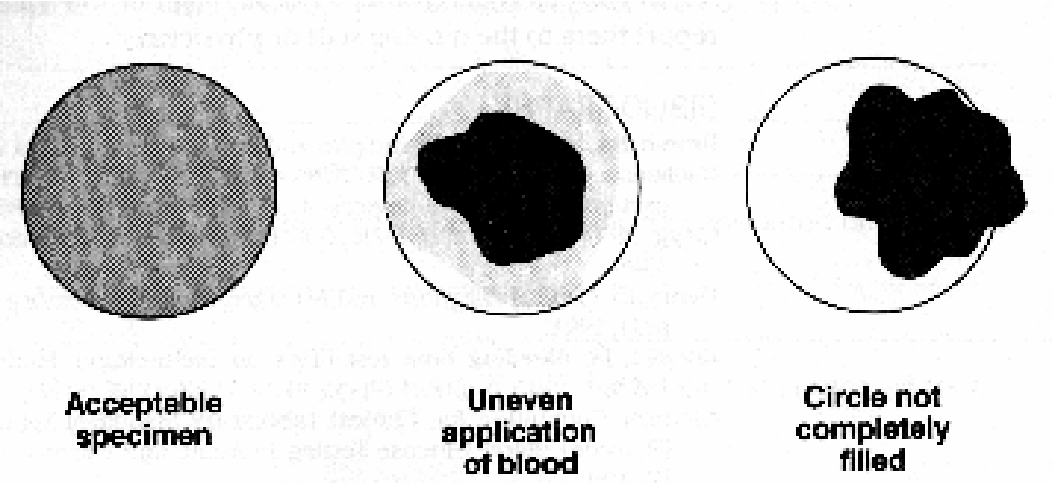
[4] Clinics and wards in the Landstuhl Regional Medical Center should place the PKU card in a dry envelope and deliver to DPALS on the day of collection. The specimen can be delivered to the Front Desk in the patient Reception and Waiting area Monday – Friday from 0730 – 1700 hrs. After 1700 hrs. and on weekends, specimens can be dropped off in Room G221, next door to the patient Reception and Waiting room. Completely fill out the specimen sign-in log prior to leaving and ensure that orders have been placed in CHCS or that a lab slip accompanies the specimen.

[5] Newborn screening is performed by a reference laboratory in the United States. Specimens must reach the reference laboratory within ten days of collection. Therefore, it is imperative that specimens be delivered to the DPALS as quickly as possible. Specimens are normally mailed on Monday, Wednesday and Friday.

The proper portion of the heel to be used for the heel stick



Appearance of Blood Spots after Specimen Collection



Place the preprinted circle of the filter paper on the blood drop so that the blood completely fills the preprinted circle AND soaks through to the back of the filter paper

HEREDITARY METABOLIC DISORDERS
Maryland State DHMH, Laboratories Administration
PO Box 2355, Baltimore, MD 21203 Phone: 410-767-6099

Patient: Mother's SS#_____

Outlying Clinics Place CHCS Label <-- Here

Hospital where Born:_____**FT**_____**NICU**_____
Pediatrician:_____
Date of birth:_____ **Hr:**_____

Birth Weight:
____ > 2500 g
____ 2001 – 2500 g
____ 1501 – 2000 g
____ 1001 – 1500 g
____ ≤ 1000 g

Feeding:
____ Breast
____ Lactose Formula
____ **Lactose-free** Formula
____ TPN ____ Gm protein/kg/day
____ NPO

1st Milk/TPN Feeding Date: _____ Hr. _____
Specimen Date: _____ Hr. _____

Sex: ___ Male ___ Female ___Ambiguous
Race: ___ White ___Nat. Amer. ___ Black ___ Hispanic ___ Asian ___ Other
Gestational Age: _____
Infant Health: ___ **Well** ___ Ill
Antibiotics: ___ Mother___**Infant**

RBC Transfusion: ___Single ___ Exchange Date: _____

Mother/Guardian: _____ Age: _____
First Name Last Name

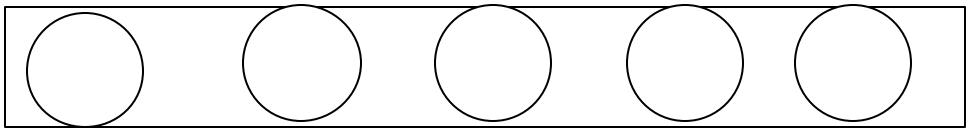
Address: _____
City:_____ State: _____ Zip Code: _____
Telephone: _____

Hearing Screening Status at Discharge: Type of test _____OAE _____ABR
Right: _____ Passed _____ Not Passed _____ Not tested
Left: _____ Passed _____ Not Passed _____ Not tested

Check all that apply:
___ Apgar 0-3 at 5 min. ___Head/Neck defect(s) ___Positive TORCH studies
___Ototoxic drugs ___Bact./viral meningitis ___Family history hearing loss

DHMH-77 5/02 **N190016**

FILL ALL CIRCLES WITH BLOOD **N190016**



S&S® 903™ LOT # W-011

Diagram of FORM DHMH-77

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
PKU (0-6 Days)	DHMH 77 (5 circle) Blood Spot Card 5 spots for <7 days old ROOM TEMPERATURE	Amino Acid Profile Arginine =150 µM Citruline =100 µM Valine =375 µM Leucine =312 µM Methionine =90 µM Phenylalanine =220 µM Tyrosine =400 µM Phe/Tyr Ratio <2.5 Thyrxoine =6.5 µg/dL TSH =30 µIU/mL GALT Normal Galactose =10 mg/dL Biotinidase Normal 17-OHP <58 ng/mL Hemoglobin: Normal: FA hemoglobins Borderline: FAS, FAC, FAV, A, AF, ACF, ASF, AVF, FA(C), FA(S) Abnormal: FS, FC, FSC, F, FV, FSV, FCV, FSA, FVA, FACV, FASV Acylcarnitine Profile Normal	3-4 weeks	Allow a sufficient quantity of blood to soak through to completely fill the pre-printed circle on the filter paper. Fill all required circles with blood. Do not layer successive drops of blood or apply blood more than once in the same collection circle. Avoid touching or smearing spots. Squeezing or "milking" of the area surrounding the puncture site is discouraged. Specimens must dry a minimum of four hours before they are transported. Ensure that at least 24 hours have elapsed since the baby's first milk feeding. Confirm that this is properly annotated on the PKU card. *See the three letter code interpretation at the bottom of the table.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
PKU (7-14 Days)	DHMH 77 (5 circle) Blood Spot Card 4 spots for >7 days old ROOM TEMPERATURE	Amino Acid Profile Arginine =150µM Citruline =125µM Valine =375 µM Leucine =312 µM Methionine =90 µM Phenylalanine =220 µM Tyrosine =400 µM Phe/Tyr Ratio <2.5 Thyrxoine =4.0 µg/dL TSH =30 µIU/mL GALT Normal Galactose =10 mg/dL Biotinidase Normal 17-OHP < 58 ng/mL Hemoglobin: Normal: FA hemoglobins Borderline: FAS, FAC, FAV, A, AF, ACF, ASF, AVF, FA(C), FA(S) Abnormal: FS, FC, FSC, F, FV, FSV, FCV, FSA, FVA, FACV, FASV Acylcarnitine Profile Normal		*See the three letter code interpretation at the bottom of the table.

THREE LETTER RESULT CODE INTERPRETATION

WNL – Within Normal Limits

UNSAT – Unsatisfactory; specimen must be redrawn. Normally, this is due to layering or spotting of the 5 circle collection card

IMF – Insufficient Milk Feeding; Infant must be on milk for 24 hrs or there is no annotation of the feeding time on the order form

INVAL – Invalid for CAH screen: < 24 hrs old or age unknown at the time of blood draw

TRANS – Results may represent status of donor blood. Please send another specimen four months after last transfusion.

25. **MAYO MEDICAL LABORATORY**

a. General Information:

(1) Address: Mayo Clinic
MML Accessioning Staff
Hilton 272
200 1st Street S.W.
Rochester, Minnesota 55905

(2) Telephone: (507) 266-5700
Fax: (507) 284-1790

(3) e-mail: mmLglobal@exrch.mayo.edu

b. Information on CA 27,29:

(1) Carcinoma of the breast is the most prevalent form of cancer in women. These tumors often produce mucinous antigens that are large molecular weight glycoproteins with 0-linked oligosaccharide chains.

(2) Monoclonal antibodies directed against these antigens have been developed, and several immunoassays are available to quantitate the levels of tumor-associated mucinous antigens in serum.

(3) The antibodies recognize epitopes of a breast cancer-associated antigen encoded by the human MUC-1 gene which is known by several names, including MAM6, milk mucin antigen, CA 27,29, and CA 15-3.

(4) Usefulness of the test.

(a) Measurements of CA 27,29 in women with treated carcinoma of the breast may be useful for predicting early recurrence of disease.

(b) The Food and Drug Administration has approved CA 27,29 for serial testing in women with prior stage II or III breast cancer who are clinically free of disease.

(c) Testing for CA 27,29 should be performed in conjunction with other clinical methods used for the early detection of recurrence.

(5) Cautions.

(a) This test provides results on female patients only at this time.

(b) The use of CA 27,29 has not been demonstrated to provide clinical benefit to these patients which has led some Mayo clinical investigators to conclude there is insufficient justification for routine clinical use of this new marker.

(c) Measurement of CA 27,29 is not useful as a screening test in women for carcinoma of the breast.

(d) Some patients who have been exposed to mouse antigens, either in the environment or as part of a treatment or imaging procedure, may have circulating anti-mouse antibodies present. These antibodies may interfere with the assay reagents to produce unreliable CA 27,29 results.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Breast Carcinoma Assoc. Antigen (CA 27,29) Chemiluminometric Immunoassay	1 mL serum FROZEN	Males = 38U/mL Females ? 38 U/mL Serum markers are not specific for malignancy and values may vary by method.	2-3 weeks	Collect in plain red top tubes (no serum separator) Specimens showing apparent hemolysis or lipemia will be rejected Increased levels of CA 27, 29 (>38 U/mL) may indicate recurrent disease in a woman with treated breast carcinoma and may be useful as an indication that additional tests or procedures should be performed to confirm recurrence. REQUIREMENT: Must fill out DD Form 2161, Referral for Civilian Medical Care and please send form with patient or specimen to the lab.
Myelin Basic Protein ELISA	0.5 mL of CSF FROZEN	< 1.5 ng/mL	2 – 3 weeks	

26. **QUEST DIAGNOSTICS**

General Information:

(1) Address: Quest Diagnostics
Unit B1 Parkway West
Cranford Lane
Heston
Middlesex, England
TW5 9QA

(2) Telephone: 00-44-500-55-2222 (Customer Service)

(3) e-mail: Tony.J.Gill@QuestDiagnostics.com

(4) Website: http://cas2.questdiagnostics.com/scripts/dos.wls?wlapp=DOS

(5) Quest Diagnostics is used primarily for Renin Activity testing and the 12 Valent Pneumococcal Serotype Analysis. Other testing is available; please call the Central Processing Section for assistance.

QUEST DIAGNOSTICS TEST LIST

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Inhibin A EIA	2 mL serum Ship FROZEN	Females: Pre-menopausal: Less than 98 pg/mL Post-menopausal: Less than 10 pg/mL Males: less than 21 pg/mL	6-16 days	REQUIREMENT: Must fill out DD Form 2161, Referral for Civilian Medical Care; please send form with patient or specimen to the lab.
Inhibin B ELISA	1 mL serum Ship FROZEN	Pre-menopausal women: Less than 255 pg/mL Post-menopausal women: Less than 30 pg/mL Males: less than 305 pg/mL <u>Pediatric Ranges</u>: 3 – 9 years of age: Females: less than 30 pg/mL Males: 161 pg/mL or less 10 – 13 years of age: Females: 92 pg/mL or less Males: 42 – 339 pg/mL 14 – 17 years of age: Females: 139 pg/mL or less Males: 68 - 300 pg/mL		REQUIREMENT: Must fill out DD Form 2161, Referral for Civilian Medical Care; please send form with patient or specimen to the lab.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Pneumococcal Ab Panel	1 mL of serum collected in a serum separator tube REFRIGERATE Specimens must be clearly marked as “pre” and “post” vaccination sera.	All values in µg/mL Reference Range in Years Sero- Pre-* Post-* type 2-7 8-14 15-up 1 ≤1.4; ≥3.0 ≥3.0 ≥4.5 3 ≤1.4; ≥3.0 ≥4.5 ≥4.5 4 ≤1.4; ≥1.5 ≥1.5 ≥1.5 26(6B) ≤1.4; ≥1.5 ≥3.0 ≥3.0 8 ≤1.4; ≥3.0 ≥4.5 ≥4.5 9(9N) ≤1.4; ≥3.0 ≥4.5 ≥4.5 12(12F) ≤1.4; ≥1.5 ≥3.0 ≥3.0 14 ≤1.4; ≥3.0 ≥4.5 ≥4.5 19(19F) ≤1.4; ≥1.5 ≥1.5 ≥3.0 23(23F) ≤1.4; ≥1.5 ≥4.5 ≥4.5 51(7F) ≤1.4; ≥1.5 ≥1.5 ≥1.5 56(18C) ≤1.4; ≥3.0 ≥3.0 ≥3.0 *(Pre- and Post- vaccine)		There is no reference range established for patients under 2 years old. This pneumococcal IgG antibody assay tests for IgG response to 12 purified pneumococcal polysaccharide antigens included in the 23 valent vaccine – Pneumovax. Tested sera are pre-absorbed with cell wall polysaccharide (CWP) to provide accurate capsule-specific IgG measurements. The ability to respond to pneumococcal vaccine can be useful in evaluating the patient’s capacity to respond to complex polysaccharide antigens. For the best results it is recommended to perform testing with paired pre- and post- vaccine sera run in parallel.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Renin Activity Method: Enzyme kinetic/radioimmunoassay	3 mL (0.4 mL minimum) EDTA plasma FROZEN	Adults, supine 0.3-3.0 ng/mL/hr Adults, upright 0.4-8.8 ng/mL/hr <u>Children: supine</u> 3-12 months: ≤15.0 ng/mL/hr 1-3 years: ≤10.0 ng/mL/hr 4-6 years: ≤7.5 ng/mL/hr 7-9 years: ≤5.9 ng/mL/hr 10-12 years: ≤5.3 ng/mL/hr 13-15 years: ≤4.4 ng/mL/hr <u>Children: upright:</u> 3-12 months: not given 1-3 years: not given 4-6 years: ≤15.0 ng/mL/hr 7-9 years: ≤17.0 ng/mL/hr 10-12 years: ≤16.0 ng/mL/hr 13-15 years: ≤16.0 ng/mL/hr	3-5 days	

27. **UNIVERSITY OF CALIFORNIA, DAVIS**

General Information:

(1) Address: University of California
Coccidioidomycosis Serology Laboratory
Department of Medical Microbiology
Room 3144 Bldg MS1-A
School of Medicine
Davis, California 95616

(2) Phone: (530) 752-1757

(3) Specimen Submission Information:

(a) Submission of Serological Specimens for Coccidioidomycosis Serology.

It is essential that **adequate** serum or other body fluid (3 mL is the minimum) be submitted for initial and possible retest.

(b) Serum (not whole blood) should be separated aseptically, and sent in a sterile screw-capped container. If it is available, **aqueous thimerosal** (Merthiolate) can be added as a preservative.*

*Add 1 part of aqueous 1:1,000 thimerosal to 9 parts of serum, CSF, etc.

(c) Specimens can be mailed by regular mail, i.e., first class mail. It is not necessary to send specimens refrigerated **unless no preservative is added**. For overnight deliveries, a cold pack can be included. Sending specimens with dry ice is overly expensive and the refrigerant effect has usually dissipated by the time the specimen is delivered to the U of California laboratory.

(d) If repeat specimens are sent, the original information should not be repeated, merely a brief interval note relating developments since previous specimen(s); also, if on chemotherapy, total accumulated dosage (by route); if patient has meningitis, please include: cell count, glucose and protein test results, and anatomical source: lumbar, cisternal, or ventricular. These interval notes with current status are important for interpretation.

(e) Cutaneous reactivity to coccidioidin is often established before humoral antibodies are detectable. However, if coccidioidomycosis is suspected, serum should be submitted regardless of skin test results.

(f) Specimens and relevant letters should be sent by mail to:

D. Pappagianis, M.D.
P.O. Box 1440
Davis, CA 95617

OR by courier to:

D. Pappagianis, M.D.
Department of Medical Microbiology
Room 3144, Tupper Hall
School of Medicine
University of California
Davis, CA, 95616-8645

(4) Website Information.

University of California, Davis (Coccidioidomycosis Serology Laboratory)
http://som.ucdavis.edu/departments/pathology/clinical/

Patient Testing Request Form
http://som.ucdavis.edu/departments/microbiology/coccy/forms/humanrequestform.pdf

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Complement Fixation (quantitative)	Serum Separator Tube – (5 mL); Serum, plain red top (4 mL), (minimum 1.5 mL); or 5 mL CSF (minimum 2 mL) REFRIGERATE	See Report	Test performed MON-FRI. With shipping - 2 weeks.	
Immunodiffusion (ID) Test	Serum Separator Tube - (5 mL) Serum, plain red top (4 mL), (minimum 1.5 mL); or 5 mL CSF (minimum 2 mL) REFRIGERATE	Titer	Test performed MON-FRI. With shipping - 2 weeks.	This test is qualitative for PPTN (IgM) and CF (IgG)

28. **UNIVERSITY OF KAISERSLAUTERN**

General Information:

(1) Address: Institut fur Immunologie und Genetik
Hellmut-Hartert Strasse 1
67653 Kaiserslautern

(2) Telephone: 0631 3167017 or 0631316700
Fax: 0631 3167020

(3) E-mail: tpx.imm@t-online.de

(4) Website:

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Chromosome Analysis (Amniotic Fluid)	Amniotic Fluid ROOM TEMPERATURE	See Report	5 days	
Chromosome Analysis (Bone Marrow)	Send in sterile tube (after removing needle). ROOM TEMPERATURE	See Report	5 days	Telephonic arrangements must be made with the Hematology Section and the Central Processing section prior to collecting the specimen. The specimen must be collected prior to 1000 hrs. on the day it is to be tested. Testing is performed Monday through Friday only and never on American or German holidays. Contact the laboratory. A special form is needed for this test.
Chromosome Analysis (Peripheral Blood)	Heparin Blood ROOM TEMPERATURE	See Report	5 days	

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
Chromosome Analysis (Tissue Specimen)	Tissue Specimen Specimen must be placed in RPMI at ROOM TEMPERATURE	See Report	5 days	Telephonic arrangements must be made with the Central Processing section prior to collecting the specimen. The specimen must be collected prior to 1000 hrs. on the day it is to be tested. Testing is performed Monday through Friday only and never on American or German holidays.
Cytogenetic Analysis (FISH)	Tissue Specimen Specimen must be placed in RPMI at ROOM TEMPERATURE	See Report	5 days	Telephonic arrangements must be made with the Central Processing section prior to collecting the specimen. The specimen must be collected prior to 1000 hrs. on the day it is to be tested. Testing is performed Monday through Friday only and never on American or German holidays.
PNH Flow Cytometry	CSF (in tubes); Pleural Fluid (in tube); Bone marrow (in sterile container); blood (in EDTA tube); Tissue (in a cup); Bronchial Lavage (in sterile tube) ROOM TEMPERATURE	See Report	5 days	Send to laboratory immediately. Must have pathologist approval.

29. **WALTER REED INSTITUTE OF RESEARCH (WRAIR) - HIV DIAGNOSTIC LABORATORY**

a. General Information:

(1) Address: Walter Reed Army Institute of Research
Department of Molecular Diagnostics & Pathogenesis
(Specimen Processing Lab)
1 Taft Ct, Suite 104
Rockville, MD 20850

(2) Phone: (301) 251-5000 Fax: (301) 762-7640

(3) Website: http://wrair-www.army.mil/ or: http://hivresearch.org/

(4) ALL HIV TESTING IN USAREUR IS SENT TO THE HIV DIAGNOSTIC LABORATORY (Rockville, MD). Personnel who have experienced a bloodborne pathogen exposure can obtain a Rapid HIV test at LRMC (See Section 11, Clinical Microbiology). Those individuals that meet the requirements in the OTSG MEMO, Rapid HIV Antibody Testing Prior to Smallpox Vaccination before Deployment (MAR 2003) may also qualify for the Rapid HIV test.

b. Department of Molecular Diagnostics & Pathogenesis (DMDP).

(1) The Department of Molecular Diagnostics & Pathogenesis (DMDP), Division of Retrovirology, at the Walter Reed Army Institute of Research (WRAIR), is a Retrovirology reference laboratory offering the following testing to Department of Defense (DoD) sites:

(a) Serological (ELISA [EIA] and Western blot) testing for antibodies against HIV-1, HIV-2, HTLV-I and HTLV-II in human blood.

NOTE: Only USAREUR (Army European Theater) is authorized to use WRAIR to meet Force Screen HIV testing requirements. Non-USAREUR facilities MUST use Service Directed Testing Facilities.

(b) RNA-PCR (Roche AmplicorTM) viral load assay for direct measurement of HIV.

(c) CD4+ T cell determinations by immunophenotyping peripheral blood lymphocytes using flow cytometric detection.

(d) HIV resistance genotyping.

(e) Other tests are available as an aid in diagnosing HIV infection; these tests must be PREAPPROVED by WRAIR, (see paragraph below).

NOTE: WRAIR follows testing algorithms and may modify your request in order to run an initial screening test and then reflex it, if needed, to the test you requested. Blood Donor Testing Algorithms will not be modified.

(2) The following programs are offered only to Department of the Army (DA) sites:

(a) HIV-1 Force Screen testing for the European Theater (**USAREUR ONLY**).

(b) Blood donor confirmatory and supplemental testing: HIV-1 Western blot, HIV-2 EIA, HTLV I/II EIA, Hepatitis B Surface Antigen Neutralization (HBsAG), Hepatitis C (HCV) by RIBA 3.0 and HTLV I/II Western blot.

(c) Hepatitis C confirmatory assay (HCV) by RIBA 3.0.

(3) ADDRESS

(a) **SPECIMEN SUBMISSION SHIPPING ADDRESS:**

Department of Molecular Diagnostics & Pathogenesis (Specimen Processing Lab)
1 Taft Ct, Suite 104
Rockville, MD 20850

(b) **MAILING ADDRESS (correspondence only):**

Department of Molecular Diagnostics & Pathogenesis
1600 E. Gude Drive
Rockville, MD 20850
Telephone: (301) 251-5000
Fax: (301) 294-2186

c. HIV Genome Analysis Information: The Physician will receive a report form that lists all relevant mutations and the drug resistance associated with that mutation. All PRO (protease) and RT (reverse transcriptase) mutations that are reported in this test are selected from relevant peer reviewed medical journal articles and information supplied by the drug manufacturers. As new mutations are identified, along with new drugs, they will be added to the list and reported as such in the test reports.

d. Other HIV, HTLV, and HCV testing methodologies are offered at the HIV Diagnostic Laboratory. Please call Central Processing at 486-8019 to inquire.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
HIV 1/2 Method: ELISA	Serum, store REFRIGERATED, ship FROZEN	None Detected	5-10 days from delivery at WRAIR	This test detects circulating antibodies to HIV-1/2 in the patient's blood. This test is performed at the HIV Diagnostic Laboratory (HDL) at DMDP, and utilizes a commercially available, whole viral lysate ELISA kit made by BioRad.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
HIV Genome Analysis	2 mL EDTA plasma; separate plasma from cells within four (4) hours of draw – store FROZEN and specimen must arrive FROZEN	Specimens that do not generate sufficient amplified product or sequence profile are reported as "Not Determined" in all drug fields. If viral load is less than 1000 or Below Detection Limit of the assay, a comment that specimen had insufficient viral load for testing will be placed on the report. The Visible Genetics TRUGENE test provides an interpretative report. If no mutations are noted for a drug, the report will state "none. No interpretation of drug resistance level is included in the HIV-1 Resistance Genotype report.	15-25 business days	-Verify patient identification and tests needed before draw. -Cleanse the area before collection, inform the patient on the purpose of the blood draw, and assure the sample is collected in a non-traumatic manner (ensure patient is relaxed). -Using a vacutainer-type system, fill until the tube is full. - If using a syringe for blood collection, to avoid hemolysis when filling the tubes, let the tube's vacuum draw the blood from the syringe (do not depress the plunger manually) up to the tube's capacity.
HIV RNA-PCR Quant	2 mL EDTA plasma; separate plasma from cells within four (4) hours of draw - store FROZEN and specimen must arrive FROZEN	<u>Standard</u> 400-750,000 copies/mL <u>Ultra-sensitive</u> 50-100,000 copies/mL	5-7 day turn around	To order the ultra sensitive assay, write in the word "Ultra Sensitive" in the "Comments" portion of the Test Request Form. This assay quantitates RNA from patients infected with HIV-1 group M, subtypes (clades) A-H.

30. **WILFORD HALL MEDICAL CENTER - TRANSPLANT IMMUNOLOGY LABORATORY**

General Information:

(1) Address: Transplant Immunology Laboratory
59th Medical Wing/MTLLO
ATTN: Lab Shipping
2200 Bergquist Drive, Ste 1
Lackland AFB, Texas 78236-5300

(2) Phone: (210) 292-6838/7510
DSN: 554-6838/7510

(3) E-mail: reilly.patricia@59mdw.whmc.af.mil
ohara.evan@59mdw.whmc.af.mil

(4) DPALS must be notified prior to submitting specimens for HLA testing. This will ensure prompt shipping of the specimen.

Test Test Method	Specimen Shipping Requirements	Reference Range	Turnaround Time	Comments
HLA ABC Phenotype	20 mL whole blood, collected in ACD (two 10 mL yellow top tubes). Store at Room Temperature	See Report	1-2 weeks	Specify the clinical indication on the test requisition. Please note the specific disease association or experimental protocol, if applicable.
HLA DR/DQ Phenotype	20 mL whole blood, collected in ACD (two 10 mL yellow top tubes). Store at Room Temperature	See Report	1-2 weeks	Specify the clinical indication on the test requisition. Please note the specific disease association or experimental protocol, if applicable.

31. **REMOTE LOCATION SPECIMEN SUBMISSION GUIDELINES**

a. LRMC DPALS Central Processing Addresses:

(1) **FEDEX and DHL**

Commander
Landstuhl Regional Medical Center
Attn: NCOIC, DPALS Central Processing
Gebaude 3738, Zimmer 116
66849 Landstuhl/Kirchberg

(2) **US Mail (USPS), Military Postal Service (MPS), or Military Air Lift**

Commander
Landstuhl Regional Medical Center
CMR 402
Attn: NCOIC, DPALS Central Processing
BLDG 3738, Rm 116
APO AE 09180

b. Specimen Submission Instructions: The Landstuhl Regional Medical Center (LRMC) Department of Pathology and Area Laboratory Services' (DPALS) Central Processing Section is providing this guidance as a specific aid for remote (downrange) Military Treatment Facilities (MTF's) that ship specimens to LRMC for analysis. Failure to follow the guidelines explained below increases the chances that a specimen will be rejected, thereby delaying patient care.

(1) **Do not ship specimens in serum separator tubes.** Pour off the serum into a transfer tube for shipping. When the specimen is left in the original serum separator draw tube for days, the separating gel cannot prevent hemoglobin released from red cells that lyse from circumventing the gel barrier and the serum specimen becomes contaminated with hemoglobin. Hemoglobin contamination of serum interferes with many analytical tests; hence, a hemolyzed specimen is unsuitable for analysis. Whole blood can be shipped in its appropriate draw tube.

(2) **Always keep urine specimens separate from other specimens and wrap the tops with Parafilm.** Urines (and feces) have a tendency to leak during shipment if not Parafilmed or taped closed. Urine/feces specimens should be shipped in their own individual biobag. Keeping the urine/feces specimens in their own individual bag will ensure that other specimens are not contaminated if the specimen should leak or spill. Secure the urine container tops with Parafilm. If a urine or feces specimen leaks or spills, that specimen, and any other specimen container or paperwork that has been contaminated, will be rejected. Ideally, urine specimen collection cups (with yellow or blue lids) should not be used to ship urine specimens. Instead, the urine specimen collection should be transferred to a urine container that is sturdy (one that has a metal or hard-plastic screw-top lid) such as NSN # 6640-00-165-5778.

(3) **Do not send all specimens (blood tubes) in one bag (maximum 10 per bag**). Separate specimens into a few smaller bags. This ensures that if a top pops off, or if a tube breaks, and blood or serum is spilled, fewer specimens will be affected. Ten specimens per bag is the maximum accepted. Individual glass tubes should have absorbent/cushioning material wrapped around them before being placed in a bag with other specimens to help prevent glass-to-glass contact and resultant breakage during shipment.

(4) **Do not fill a transfer tube more than halfway with serum/plasma if you are going to freeze it.** If the tube is too full, freezing will cause the top to pop off. When the tube thaws the serum/plasma will spill. Only fill the tube halfway if it is to be frozen prior to shipment/shipped frozen.

(5) **Always provide legible full names, social security numbers, date of birth, and test to be performed on the tube.** If the requesting location has access to the Composite Health Care System (CHCS) and the specimen labels are system generated/printed, this guidance does not apply. If the requesting location does not have CHCS capability, the handwritten information on the tube labels must match the demographic information in CHCS and/or the Defense Enrollment Eligibility Reporting System (DEERS) for LRMC DPALS' Central Processing personnel to process the specimens. Take the time to ensure that all information is correct and legible. Central Processing personnel must have a correct date of birth (DOB) to mini-register an individual that is not in our CHCS data base. Without a DOB, Central Processing personnel are unable to match the individual with DEERS and the specimens will be rejected.

(6) **Always include a typed shipping document listing all included specimens with each shipment.** If the requesting location has access to LRMC's CHCS, this guidance does not apply as all shipments sent should then be accompanied by a transmittal list generated by CHCS. If the requesting location does not have access to LRMC's CHCS platform, a typed shipping document must be submitted, which allows Central Processing personnel to establish positive control of the requesting location's specimens and to subsequently e-mail results in a timely manner. The information on the list should match the information on the tubes. If a mismatch occurs, Central Processing personnel will reject the specimen.

(7) Remote requesting location POCs can find a template to be used for making a shipping document (TABLE A). All information on the shipping document template must be provided as the information is required for mini-registration into the CHCS data base. A test order form (TABLE B) that should be utilized as well is also provided. Utilization of the shipping document template and correct mailing address will better ensure our ability to help you and your patients.

c. CHCS Accounts. To establish CHCS accounts for results retrieval and to access Laboratory Test Information (CHCS menu option LTI), please contact Ms Geralyn Essick, Information Technology Division, Landstuhl Regional Medical Center. The following information must be provided in order to establish a User account on the Central European CHCS platform: last name, first name, middle initial, SSN, date of birth, rank, and specialty/MOS. For Health Care Providers, the information provided is cross-checked against credentialing records to verify provider status. The information to establish a User account can be e-mailed directly to Geralyn.Essick@us.army.mil or, alternatively, she may be contacted at DSN 314-486-8828.

APPENDIX A

ABBREVIATIONS: Unless otherwise indicated, the following abbreviations will be used throughout this manual to indicate the test methodology used.

AAS: atomic absorption spectrophotometry

AU: Arbitrary Units

b-DNA: branched-DNA

CF: Complement fixation

CIE: Counterimmunoelectrophoresis

DPD: Dichlorophenyl diazonium salt

EIA: Enzyme Immunoassay

ELISA: Enzyme-linked Immunosorbent Assay

FEIA: Fluorescent Enzyme Immuno Assay

FPIA: Fluorescent Polarization Immunoassay

GC: Gas chromatography

GC-MS: Gas chromatography - mass spectrometry

HAG: Heat aggregated IgG

HIR: Hemolysis Inhibition Reaction

HIT: Hemagglutination Inhibition Test

HPLC: High-Performance/Pressure Liquid Chromatography

IF: Immunoflourescence

IFCC: International Federation of Clinical Chemistry

IHA: Indirect Hemagglutination

ILMA: Immunoluminometric assay

IRMA: Immuno Radiometric Assay

ISAGA: Immunosorbent Agglutination Assay

LA: Latex Agglutination

LCR: Ligase chain reaction

LIA: Luminescence Immunoassay

MEIA: Microparticle Enzyme Immuno Assay

MONA: Multiple Of Nonspecific Activity

PCR: Polymerase Chain Reaction

REA: Radio Enzymatic Assay

RIA: Radio Immuno Assay

RID: Radial Immunodiffusion

TRACE: Time Resolved Amplified Cryptate Emission

VIEU: Vienna Units (according to Prof. Kunz, Vienna)

WB: Western Blot

APPENDIX B

This table contains the listing of tests, as contained in the individual section tables, available at LRMC or at the military and commercial laboratories we refer testing to and the specimen submission requirements for those tests. (NOTE: Not all tests sent to referral laboratories are lis ted in this manual, only those most commonly ordered are listed. The most up to date listing of tests and submission requirements is on the CHCS system itself. Should there be any question regarding whether a test is available or where it is available and what specimen submission requirements pertain, please check CHCS using the LTI (Lab Test Information) function. Alternatively, submitters can access Bioscientia's (our primary referral laboratory) submission manuals at http://www.bioscientia.de/. Click on the British flag on Bioscientia's Home Page to view the site in English. Please call the lab at 486-7494 / 8019 / 8092 if you cannot find the test you desire.)

TEST NAME	LAB MANUAL SECTION
11 Desoxycortisol (compound S)	21
17-Ketosteroid Fractionation	21
17-OH Pregnenolone (serum, urine)	21
17-OH Progesterone	21
18-OH-Corticosterone	21
5-HIAA	21
5-Nucleotidase	21
5-OH-Tryptophan	21
ABO/RH	14
Acetaminophen	9
Acetone (urine; quantitative)	21
Acetone, Qualitative (Ketone; urine)	9
Acetylcholine Receptor Abs	21
Acetylcholinesterase (A.F.)	21
Acetylcholinesterase (B)	21
Acid Fast Culture (see Culture, Mycobacterium)	11
Acid Phosphatase (Prostatic and Total)	21
Acinetobacter Screen	11
Acinus Cell Abs	21
ACTH - Adrenocorticotrophic Hormone (intact)	21
Adeno Virus Detection	21
Adenosine Deaminase	21
Adenovirus Antibodies	21
ADH (includes Osmolality)	21
Adrenal Cortex Abs	21
AFB Culture/Smear (see Culture, Mycobacterium)	11
Afipia felis (see Cat Scratch Fever)	21
AFP (serum) (see Alpha Fetoprotein)	9
Alanine aminotransferase (ALT)	9
Albumin (CSF)	21
Albumin (serum)	9
Albumin (urine; Microalbumin; qualitative)	9
Albumin (urine; Microalbumin; quantitative)	21
Aldolase	21
Aldosterone	21

TEST NAME	LAB MANUAL SECTION
Alkaline Leukocyte Phosphatase (ALP)	21
Alkaline Phosphatase	9
Alkaline Phosphatase Isoenzymes	21
Alpha Amylase (serum; Total)	21
Alpha Amylase (urine)	21
Alpha Fetoprotein, Maternal Serum	9
Alpha Fetoprotein, Tumor	9
Alpha Fucosidase	21
Alpha Galactosidase	21
Alpha Glucosidase	21
Alpha-1-Antitrypsin	18
Alpha-1-Antitrypsin (Phenotype)	21
Alpha-1-Glycoprotein	21
Alprazolam	21
Aluminum	21
Amikacin	21
Amino Acids (Quantitative)	21
Amiodarone & Desethylamiodarone	21
Amitriptyline & Nortriptyline	21
Ammonia (NH_3)	9
Amoebic Abs	21
Amylase	9
Amylase Isoenzyme (see Isoamylase)	21
ANCA-C & ANCA-P (Granulocyte Cytoplasma IgG Abs)	21
Androstenedione	21
Androsterone	21
Angiotensin-1-Converting Enzyme (ACE)	21
Anti Calcium Channel Abs	21
Anti Centromere Abs (see Centromere Abs)	21
Anti Diuretic Hormone (see ADH)	21
Anti DNA (Double Stranded) Ab	12
Anti DNA Single Strand[see DNA Abs (Single Strand)]	21
Anti DNASE (Anti Desoxyribonuclease)	21
Anti HAV Screening	21
Anti Hepatitis B Surface Antigen	12
Anti HU	21
Anti Nuclear Antibody (ANA)	12
Anti Platelet Abs (bound and free)	21
Anti Ri	21
Anti Salivary Gland Abs (see *Parotis canaliculi* & *Acini* Abs)	21
Anti Streptococcal Hyaluronidase (ASH)	21
Anti Streptolysin O (ASO)	12
Anti Thrombin III	21
Antibody Screen	14
APC Resistance	21
Apolipoprotein A1	21
Apolipoprotein B	21

TEST NAME	LAB MANUAL SECTION
Arsenic (blood, hair, urine)	21
Arylsulfatase A (blood, urine)	21
Ascaris Abs IgG	21
Ascaris Western blot IgG & IgM	21
Aspartate aminotransferase (AST)	9
Aspergillus fumigatus, Metabolic and Somatic Abs	21
Aspergillus IgG Abs Structure	21
Autoantibody Profile	18
Avian Precipitant Abs (Specific Abs Type IgG)	21
Bacteria Agglutination Antigen	11
Bartonella (see Cat Scratch Fever)	21
Basal Membrane Abs (Glomerular and Tubular)	21
Beta 2 Microglobulin (serum, urine)	21
Beta-2-Transferrin	21
Beta Glucosidase	21
Beta Glucuronidase	21
Beta hCG, Qualitative	9
Beta hCG, Quantitative	9
Beta hCG, Triple Marker Profile	9
Beta hCG, Tumor Marker	9
Beta Hydroxy Butyrate	21
Bile Acids (total)	21
Bilharzia (Schistosoma) Abs	21
Bilirubin (Delta) (AF)	21
Bilirubin (urine)	9
Bilirubin, Direct	9
Bilirubin, Neonatal	9
Bilirubin, Total	9
Biotinidase (Quantitative)	21
Blastomyces Ab	18
Blood Gas (includes pH, PO_2, PCO_2, Base Excess, Bicarbonate, O_2 Saturation, TCO_2)	9
Blood Parasites	11
Bone Marrow Prep	10
Bordetella pertussis Abs (Whooping Cough) IgA, IgG, and IgM	21
Borrelia Abs (serum; IgM and/or IgG; see Lyme Abs IgG/IgM))	12
Borrelia IgG (CSF)	19
Borrelia IgM (CSF)	19
BRCA 1/2 Analysis	21
Breast Carcinoma Assoc Antigen (CA 27,29)	25
Budgerigar Fanciers Disease (see Avian Precipitant Abs)	21
BUN (Urea Nitrogen)	9
C Peptide	21
C1 Esterase Decay (Activity/Function)	21
C1 Esterase Inhibitor (Protein)	21
C1Q Complement Component	21

TEST NAME	LAB MANUAL SECTION
C2 Complement Component	21
C3/C4 Complement Profile	18
C3/C4/CH50 Complement Profile	18
C3D Complement Component	21
C5 Complement Component	21
C8 Complement Component	21
C9 Complement Component	21
CA 125 (Tumor Marker)	21
CA 15-3 (Tumor Marker)	21
CA 19-9 (Tumor Marker)	21
CA 27,29 (see Breast Carcinoma Assoc Antigen)	25
CA 50 (Tumor Marker)	21
Cadmium (blood, urine)	21
Calcitonin	21
Calcium	9
Calcium (urine)	9
Calcium, ionized (Ca^{++})	9
Campylobacter Abs (*jejuni* & *intestinalis*)	21
Canary Fanciers Disease (see Avian Precipitant Abs)	21
Cancer Ag 27,29 (see Breast Carcinoma Assoc Antigen)	25
Candida Abs (IgA, IgG, IgM)	21
Carbamazepine (Tegretol)	9
Carbohydrate Deficient Transferrin (CDT)	21
Carboxyhemoglobin (Carbon Monoxide; includes Total Hgb, $HgbO_2$ Saturation, $HgbO_2$, Capacity, $HgbO_2$ Content, Methemoglobin, Carboxyhemoglobin, Reduced Hgb, O_2 Hgb, O_2 Content, O_2 Capacity)	9
Carcinoembryonic Antigen (CEA)	9
Cardiolipin Ab (IgG, IgM)	21
Carnitine (Free & Total)	21
Carotene	21
Cat Scratch Fever (*Bartonella henselae* and *Bartonella quintana*)	21
Catecholamines (P) (Adrenaline, Noradrenaline, and Dopamine)	21
Catecholamines (U) (Total - Adrenaline, Noradrenaline, and Dopamine)	21
CBC	10
CD4, CD8 (see T4, T8 Lymphocytes)	21
CDT (see Carbohydrate Deficient Transferrin)	21
Cell Count (CSF)	10
Cell Count (Other)	10
Cell Count (Pericardial Fluid)	10
Cell Count (Peritoneal Fluid)	10
Cell Count (Pleural Fluid)	10
Cell Count (Synovial Fluid)	10
Cell Saver Panel	10
Centromere Abs	21
Ceruloplasmin	18

TEST NAME	LAB MANUAL SECTION
Chem 12 (includes Glucose, Potassium, Total Protein, Sodium, AST, BUN, Alkaline Phosphatase, Albumin, Total Bilirubin, Calcium, Chloride, Creatinine)	9
Chem 7 (includes Glucose, BUN, Creatinine, Sodium, Potassium, Chloride, CO_2)	9
Chlamydia pneumonia IgA & IgG Abs	21
Chlamydia psittaci IgG & IgM Abs	21
Chlamydia trachomatis (DNA)	21
Chlamydia trachomatis IgA & IgG Abs	21
Chlamydia trachomatis/*Neisseria gonorrhoeae* STD Screen	13
Chloride (CSF, urine)	21
Chloride (serum)	9
Chloropropamide (see Sulfonylurea Structure)	21
Chloroquine	21
Cholesterol, HDL	9
Cholesterol, HRA (see HRA Cholesterol)	9
Cholesterol, Low Density Lipoprotein (Calculation)	9
Cholesterol, Total	9
Cholinesterase (Pseudocholinesterase)	21
Chromium (serum, urine)	21
Chromogranin A	21
Chromosome Analysis (Amniotic Fluid)	28 (also 21)
Chromosome Analysis (Blood)	28 (also 21)
Chromosome Analysis (Bone Marrow)	28 (also 21)
Chromosome Analysis (Tissue)	28 (also 21)
Chymotrypsin	21
Ciclosporine	21
Circulating Immunocomplexes	21
Citrate (serum, sperm, urine)	21
CK (see Creatine Kinase)	9
CK-MB	9
CK-MB Panel (includes CK, CK-MB, %CK-MB)	9
Clomipramine & Desmethylclomipramine	21
Clostridium difficile	13
CO_2 (Carbon Dioxide)	9
Cobalt	21
Coccidioides Serology [see Immunodiffusion (ID) Test and/or Complement Fixation]	27
Collagen Abs Profile (Types I-VII)	21
Complement Fixation (Quant)	27
Complement, Total (see C3/C4 Complement Profile or C3/C4/CH50 Complement Profile)	18
Copper (serum, urine)	21
Coproporphyrins (feces) [see Porphyrins (F)]	21
Coproporphyrins in urine (see Porphyrins)	21
Cortisol	21
Cortisol, Free	21
Coxiella burnetti (see Q-Fever)	21

TEST NAME	LAB MANUAL SECTION
Coxiella burnetti Ab (see Rickettsia Ab Profile)	18
Coxsackie (B1-B6 &A9)	21
Creatine (serum, urine)	21
Creatine Kinase (CK)	9
Creatine Kinase Isoenzymes	21
Creatinine	9
Creatinine (urine)	9
Creatinine Clearance	9
CRP	9
CRP Ultra-Sensitive	9
Cryoglobulin (Qualitative)	21
Cryptococcal antigen	11
Cryptosporidium/*Giardia*	11
Culture, Aerobic	11
Culture, Anaerobic	11
Culture, Blood (Adult)	11
Culture, Blood (Pediatric)	11
Culture, Body Fluid	11
Culture, *Bordetella*	11
Culture, CSF	11
Culture, Fungal	11
Culture, GC	11
Culture, Genital	11
Culture, Group B Strep	11
Culture, *Mycobacterium*	11
Culture, *Mycoplasma pneumonia* (see *Mycoplasma pneumonia* Culture)	18
Culture, Respiratory	11
Culture, Respiratory Virus (see Viral Culture)	13
Culture, Stool	11
Culture, Throat	11
Culture, Urine	11
Culture, *Vibrio*/*Yersinia*/O157	11
Culture, Viral (see Viral Culture)	13
Cyanide Structure	21
Cyclosporin	21
Cystic Fibrosis Mutation Analysis	17
Cystic Fibrosis Prenatal Screen	17
Cysticercosis IgG Abs	21
Cystine (see Amino Acids)	21
Cystine, Photometric (U)	21
Cytogenetic Analysis (FISH) (Tissue Specimen)	28
Cytogenetic Testing	28 (also 21)
Cytomegalovirus (PCR)	21
Cytomegalovirus Antibody Panel (IgM/IgG)	12
Cytomegalovirus IgG	12
Cytomegalovirus IgM	12
DALA/DELTA Aminolaevulinic acid	21
DAT	14

TEST NAME	LAB MANUAL SECTION
D-Dimer Test	10
Dehydroepiandrosterone Sulphate (see DHEA -S)	21
Dengue Virus Abs, IgG & IgM	21
Depleted Uranium (metal fragments suspected to be DU)	23
Depleted Uranium 24h Bioassay	23
Depleted Uranium Screen	23
Desipramine (Norpramine)	21
Dexamethasone Level	21
DHEA-S (Dehydroepiandrosterone Sulphate)	21
Dibucaine Inhibition of the Pseudocholinesterase	21
Differential, manual	10
Digoxin	9
Dihydrostestosterone	21
Diphenylhydantoin (Phenytoin, Dilantin)	21
Diphtheria Abs	21
Disopyramide	21
Diuretic Screen	21
DNA Abs (Double Strand)	21
DNA Abs (Single Strand)	21
Dopamine (see Catecholamines)	21
Doxepine & Desmethylydoxepine	21
Drug Screen (see Urine Drug Screen)	9
Echinococcus Abs	21
Echinococcus multilocularis	21
Echo Virus (see Entero Virus)	21
Ehrlichia Abs (IgG and IgM)	21
Electrolytes (Sodium, Potassium, Chloride, CO_2, Anion Gap)	9
ENA Ab Profile	18
Endomysium IgA Abs	21
Entero Virus (Coxsackie Abs)	21
Eosinophil Count (nasal mucous, urine, blood)	10
Epstein Barr Virus Ab Profile	12
Erythrocyte Sedimentation Rate (ESR)	10
Erythropoietin (EPO)	21
Estradiol, Total	9
Estrogen Receptors	21
Ethanol	9
Ethanol (Legal Blood Alcohol Test)	9
Ethosuximide (Zarontin)	21
Factor II	21
Factor ll Molecular Analysis	21
Factor V	21
Factor V Mutation Gene (Leiden Mutation)	21
Factor VII	21
Factor VIII Activity (Von Willebrand Factor)	21
Factor VIII Associated Antigen (Von Willebrand Factor)	21

TEST NAME	LAB MANUAL SECTION
Factor VIII Multimers	21
Factor VIII Ristocetin Cofactor (Von Willebrand Factor)	21
Factor IX	21
Factor X	21
Factor XI	21
Factor XII	21
Factor XIII	21
Fatty Acids, Nonesterified FFA (Free Fatty Acids)	21
Fecal Fat [see Lipids, Total (Feces)]	21
Fecal Fat, Qualitative	11
Fecal Leukocyte	11
Felbamate	21
Ferritin	9
Fetal Hemoglobin (Kleihauer-Betke)	10
Fetal Lung Maturity	9
Fibrinogen	10
Filariosis IgG Abs	21
Flavi-Virus	20
Flunitrazepam (Rhoypnol)	21
Folate (see Vitamin B12/Folate)	9
Folic Acid in Erythrocytes (Folate)	21
Food Panel 20	21
Fragile X Syndrome (FMR1 Gene)	21
Free Estriol	9
Free PSA (see Prostatic Specific Antigen Structure)	21
Free Testosterone	21
Free Thyroxine, FT4	9
Fructosamine	21
FSME Abs IgG & IgM (see Tick-borne Encephalitis IgG & IgM Abs)	21
FT3 (Free Triiodothyronine)	21
G6PD, Qualitative	10
G6PD, Quantitative	21
Gabapentin	21
Galactokinase	21
Galactose (B, U)	21
Galactose-1-Phosphate	21
Galactose-1-Phosphate Uridyltransferase (Quantitative)	21
Gamma Glutamyl Transferase (GGT)	9
Gastrin	21
GC Screen for STD (see *Chlamydia trachomatis*/*Neisseria gonorrhoeae* STD Screen)	13
GC Smear	11
Gentamicin Peak	9
Gentamicin Trough	9
Gliadine Abs IgA & IgG Specific (Gluten Abs)	21
Glomerular Basal Membrane Abs (see Basal Membrane Abs)	21
Glucagon	21

TEST NAME	LAB MANUAL SECTION
Glucose	9
Glucose (urine)	9
Glucose-6-Phosphate Dehydrogenase (see G6PD)	
Glutamate Decarboxylase Abs (GAD)	21
Gold	21
Gonococcal Abs	21
Gram Stain	11
Growth Hormone (see HGH)	21
Hair Screen	21
Ham's Test	21
Hanta Virus Abs	21
Haptoglobin	18
HAV RNA PCR (feces)	18
HBV DNA (Qualitative)	21
HBV DNA (Quantitative)	21
hCG (see Beta hCG)	9
HCV RNA (Qualitative)	21
HCV RNA (Quantitative)	21
HCV Genotyping	21
HDL Cholesterol (see Cholesterol, HDL)	9
Helicobacter Immunoblot (IgA & IgG)	21
Helicobacter pylori Ab (IgA & IgG)	21
Helicobacter pylori Ab (IgG)	18
Helicobacter pylori Stool Antigen (H Pylori Ag)	21
Hematocrit, manual	10
Hemochromatosis Gene (HFE)	21
Hemoglobin A1C, Glycosylated HGB	9
Hemoglobin Electrophoresis	18
Hemoglobin S Screen, Sickledex	10
Hemosiderin	21
Hepatitis A Abs (see Anti HAV Screening)	21
Hepatitis A IgM	12
Hepatitis Acute Profile	12
Hepatitis B Core Antibody	12
Hepatitis B Panel	12
Hepatitis B Surface Antibody (see Anti Hepatitis B Surface Antigen)	12
Hepatitis B Surface Antigen	12
Hepatitis B_e Ab (see Hepatitis B Surface Ag)	18
Hepatitis B_e Ag (see Hepatitis B Surface Ag)	18
Hepatitis C Antibody	12
Hepatitis Delta Abs	21
Hepatitis E Virus Abs	21
Herpes Ab Profile (Bio)	21
Herpes Ab Profile (LSL) [see *Herpes simplex* Virus Antibody Panel (IgM/IgG)]	12
Herpes simplex Culture	13
Herpes simplex Virus Abs (Type I/II)	21
Herpes simplex Virus Antibody Panel (IgM/IgG)	12

TEST NAME	LAB MANUAL SECTION
[*Herpes* Ab Profile (LSL)]	
Herpes simplex Virus IgG	12
Herpes simplex Virus IgM	12
Herpes simplex Virus Type 1 & 2 DNA (PCR)	21
Herpes Virus Type 6 IgG & IgM	21
Hexokinase	21
Hexosaminidase A	21
Hexosaminidase A & B	21
Hexosaminidase B	21
HGH (Human Growth Hormone)	21
Hippuric Acid	21
Histamine (blood, urine)	21
Histone Abs	21
Histoplasma capsulatum Abs	21
HIV 1/2	29
HIV 1/2 Force Testing Screen (Army Labs; see HIV 1/2)	29
HIV Genome Analysis	29
HIV RNA PCR (Quant)	29
HIV-1 Quant	21
HLA ABC Phenotype	30
HLA B27	21
HLA DR/DQ Phenotype	30
Homocysteine	21
HRA Cholesterol	9
HTLV I/II Abs	21
HVA (Homovanillic Acid)	21
Hydroxyproline (Total)	21
IgA Quantitative (S)	21
IgE Quantitative (S)	21
IGF-1 (Somatomedin C)	21
IGFBP-3 (Insulin Like Growth Factor Binding Protein 3)	21
IgG (Quantitative) (CSF)	21
IgG Subclasses	21
IgM, Quantitative (CSF)	21
IgM, Quantitative (S)	21
Imipramine & Desipramine	21
Immunodiffusion (ID) Test	27
Immunofixation (Immunoelectrophoresis)	21
Immunoglobulin E (IgE)	18
Immunoglobulin Profile (IgA, IgG, IgM)	18
Influenza A	21
Influenza B	21
Influenza Rapid Ag (see Rapid Influenza Ag)	11
Inhalation Panel 20	21
Inhibin A & B	26
INR	10
Insulin	21
Insulin Abs (Human) Auto Antibodies	21
Insulin C Peptide (see C-Peptide)	21

TEST NAME	LAB MANUAL SECTION
Intrinsic Factor Abs	21
Iodine (Total)	21
Iron in Liver Tissue	21
Iron/TIBC	9
Islet Cell Abs (Qualitative and Quantitative)	21
Isoamylase (Alpha Amylase Isoenzyme)	21
Kleihauer-Betke (see Fetal Hemoglobin)	10
KOH Prep	11
Lactate (CSF)	21
Lactate (plasma)	9
Lactate Dehydrogenase (LDH)	9
Lamotrigin	21
LAP (Leucine Aminopeptidase)	21
Laxative Screening	21
LDH (see Lactate Dehydrogenase)	9
LDH Isoenzymes (Lactate Dehydrogenase Isoenzymes)	21
Lead	22
Lead (Urine)	21
Legal Blood Alcohol Test [see Ethanol (Legal Blood Alcohol Test)	9
Legionella Ab	21
Legionella Pneumophila Antigen	21
Leiden Mutation (see Factor V Mutation Gene)	21
Leishmania IHA & IgG & IgM	21
Leptospira Abs	21
LH/FSH	9
Lidocaine	21
Lipase	9
Lipid Profile	9
Lipid Screen (Cholesterol & Triglyceride)	9
Lipids, Total (Feces)	21
Lipoprotein (a)	21
Lipoprotein Electrophoresis	21
Listeria Abs	21
Lithium	9
Liver Kidney Microsomal Abs	21
Liver Panel (Liver function tests, Hepatic panel; includes Albumin, ALT, AST, Alkaline Phosphatase, Total Bilirubin)	9
Lupus Anticoagulants/Lupus Inhibitors	21
Lyme Ab (Lyme Immunoblot) [see Lyme Ab Panel (IgM/IgG)]	12
Lyme Ab Panel (IgM/IgG)	12
Lymphocyte Chorionic Meningitis Virus IgG & IgM (LCM)	21
Lysozyme (serum, urine)	21
Magnesium	9
Magnesium (Urine) (Method: AAS)	21
Malaria & *Plasmodium falciparum* Antigen	21

TEST NAME	LAB MANUAL SECTION
Malaria Abs	21
Mercury (blood, feces, urine)	21
Metanephrine & Normetanephrine (Total)	21
Methotrexate	21
Methylmalonic Acid (urine)	21
MHA-TP (see *Treponema pallidum*-Particle Agglutination)	12
Microalbumin (see Albumin)	
Microsomal/Thyroglobulin Antibody	12
Mixing Study	10
Monospot	12
MRSA (Methicillin-resistant *Staphylococcus aureus*) Screen	11
Mucopolysaccharides (Quantitative)	21
Mumps Antibody Panel (IgM/IgG)	12
Mumps IgG	12
Mumps IgM	12
Mycoplasma pneumonia Abs	21
Mycoplasma pneumonia Culture	18
Myelin Associated Glycoprotein Abs	21
Myelin Basic Protein	25
Myoglobulin (Quantitative)	21
N-acetyl procainamide (NAPA; see Procainamide/NAPA)	21
Neisseria gonorrhoeae STD Screen (see *Chlamydia trachomatis*/*Neisseria gonorrhoeae* STD Screen)	13
Nickel (serum, urine)	21
Nicotine (urine)	21
Noradrenaline (see Catecholamines)	21
Nortriptyline	21
Occult Blood	11
Oligoclonal Banding	21
Organic Acids Screen	21
Osmolality	9
Osteocalcin	21
Osteoporosis Screen	21
Ova and Parasite Exam	11
Oxalate	21
Oxcarbazepine Structure	21
p-ANCA (see ANCA-C and ANCA-P)	21
Palladium	21
Pancreatic Elastase	21
Papilloma Virus (DNA)	21
Parakeet Fanciers Disease (see Avian Precipitant Abs)	21
Parathyroid Hormone (see PTH, Intact)	21
Parietal Cell Abs	21
Parotis canaliculi & *Acini* Abs	21
Parrot Fanciers Disease (see Avian Precipitant Abs.)	21
Partial Thromboplastin Time (PTT or APTT)	10

TEST NAME	LAB MANUAL SECTION
Parvo Virus B19 Abs IgG & IgM	21
Parvo Virus B19 Abs Immunoblot IgG & IgM	21
Parvovirus (PCR)	21
Pentachlorphenol	21
Pentaporphyrin (see Porphyrins, feces)	21
Pertussis (see *Bordetella pertussis*)	21
pH body fluid	9
pH gastric	9
Phenobarbital (Barbital)	9
Phenytoin (Dilantin)	9
Phosphate, Inorganic (Phosphorus)	9
Phosphorous (urine)	9
Phytanic Acid	21
Pigeon Fanciers Disease (see Avian Precipitant Abs)	21
Pinworm Prep	11
PKU (0-6 days)	24
PKU (Neonatal Screen >7 days)	24
Plasmodium falciparum Antigen (see Malaria)	21
Platelet Antibodies (see Anti Platelet Abs)	21
Pneumococcal Ab Panel	26
PNH Flow Cytometry	28
Polio Virus 1, 2, and 3 Abs	21
Porphobilinogen (quantitative)	21
Porphyrins (feces)	21
Porphyrins (urine)	21
Porphyrins in Erythrocytes (Total)	21
Post Vasectomy	10
Potassium	9
Potassium (urine)	9
Prealbumin	21
Pregnantriol	21
Prenatal Work-up	14
Primidone & Phenobarbital	21
Pro Insulin	21
Procainamide/NAPA	21
Progesterone	9
Progesterone Receptors	21
Prolactin	9
Prostatic Acid Phosphatase (PAP Immunoassay)	21
Prostatic Specific Antigen (PSA)	9
Prostatic Specific Antigen Structure	21
Protein (urine)	9
Protein C (Activity)	21
Protein Electrophoresis (Serum)	9
Protein Electrophoresis (Urine)	9
Protein S (Activity)	21
Prothrombin Mutation (Factor II mut) (see Factor ll Molecular Analysis)	21
Protime (PT)	10

TEST NAME	LAB MANUAL SECTION
Protoporphyrins (feces) [see Porphyrins (feces)]	21
PSA (see Prostatic Specific Antigen)	9
PSA Structure, Comp lex (C-PSA, PSA Ratio, Total PSA) (see Prostatic Specific Antigen Structure)	21
PTH Intact (Total-whole molecule)	21
Pyruvate	21
Q-Fever (*Coxiella burnetti*)	21
Quinidine	21
Rabies Abs	21
Rapid Group A	11
Rapid Group B	11
Rapid HIV Screen	11
Rapid Influenza Antigen	11
Rapid Plasma Reagin (RPR)	12
Rapid RSV Antigen	11
RAST Tests	21
Reducing Substances (Clinitest)	9
Renal Stone Analysis	18
Renin (Direct Measurement)	21
Renin Activity	26
Respiratory Syncytial Virus Abs (RSV)	21
Reticulin IgA & IgG	21
Reticulocyte Count	10
Rheumatoid Factor	12
Rheumatoid Factor IgA, IgG, IgM Abs	21
Rickettsia Ab Profile IgM	18
Rift Valley Virus	20
Rota Virus Ag	13
Rubella IgG	12
Rubella IgM	12
Rubeola Antibody Panel (IgM/IgG)	12
Rubeola IgG	12
Rubeola IgM	12
Salicylate (Aspirin)	9
Saline Wet Prep	11
Salmonella Abs	21
Sandfly Fever Virus Abs, IgG & IgM	21
Schistosoma (see Bilharzia)	21
Selenium	21
Semen Analysis	10
Semen Fructose	10
SHBG (Sex Hormone Binding Globulin)	21
Sodium	9
Sodium (urine)	9
Specific Gravity	9
Sperm Abs (IgA, IgG)	21
Streptococcal Anti DNASE B (see Anti DNASE)	21
Sulfonylurea Structure	21
T4 Abs	21

TEST NAME	LAB MANUAL SECTION
T4 Total (Thyroxin)	21
T4 & T8 Lymphocytes CD3, CD4, CD8	21
T&B Lymphocyte Subset Differentiation	21
Tacrolimus (FK 506)	21
Testosterone	9
Testosterone, Free (see Free Testosterone)	21
Tetanus IgG Specific Abs	21
Thallium	21
Theophylline	9
Thrombin Time	21
Thyreoglobulin	21
Thyroid Stimulating Hormone (see TSH)	9
Thyroxine (see T4)	21
Tick-Borne Encephalitis (TBE) IgG & IgM Abs	21
Tobramycin	21
TORCH Panel	12
Total Protein	9
Total Protein (urine)	9
Toxoplasma IgG	12
Toxoplasma IgM	12
Toxoplasmosis Antibody Panel (IgM/IgG)	12
Toxoplasmosis DNA	21
Transferrin	21
Trazadone	21
Treponema pallidum Particle Agglutination (TP-PA)	12
Trichinosis Abs	21
Triglycerides	9
Triglycerides, enzymatic (part of Lipid Panel)	9
Triiodothyronine, T3	9
Triple Marker Profile	9
Troponin I	21
Trypanosoma crucei Abs (Chagas)	21
Tryptase	21
TSH	9
TSH Receptor Abs	21
Tubular Basal Membrane Abs (see Basal Membrane Abs)	21
Tularaemia IgG & IgM Abs (*Francisella tularensis*)	21
Uranium Bioassay	23
Uranium Screening Test	23
Urea Nitrogen (urine)	9
Uric Acid	9
Uric Acid (urine)	9
Urinalysis	9
Urine Drug Screen (Includes Amphetamine/Methamphetamine, Barbiturate, Benzodiazepine, Cocaine, Methadone, Opiate, THC, TCA)	9
Uroporphyrinogen 1 Synthase	21

TEST NAME	LAB MANUAL SECTION
Uroporphyrins (Feces) [see Porphyrins, Total (F)]	21
Uroporphyrins (Urine) (see Porphyrins)	21
Valproic acid (Depakene)	9
Vancomycin Peak/Trough	9
Vancomycin-resistant *Enterococcus* (VRE) Screen	11
Vanillylmandelic Acid (see VMA)	21
Varicella Zoster Antibody Panel (IgM/IgG)	12
Varicella Zoster IgG	12
Varicella Zoster IgM	12
Venereal Disease Research Laboratories (VDRL)	12
VIP (Vasoactive Intestinal Polypeptide)	21
Viral Culture	13
Viscosity	21
Vitamin A (Retinol)	21
Vitamin B1 (Thiamine)	21
Vitamin B12, Folate	9
Vitamin B2 (FAD)	21
Vitamin B6 (Pyridoxal Phosphate)	21
Vitamin D (1,25 Dihydroxy Cholecalciferol)	21
Vitamin D (25 Hydroxy Cholecalciferol)	21
Vitamin E (Alpha Tocopherol)	21
Vitamin K1	21
VLDL Cholesterol	21
VLFA (Very Long Chain Fatty Acids)	21
VMA	21
Von Willebrand Factor Panel	21
West Nile Virus	20
Wet Prep (see Saline Wet Prep)	11
Xylose	21
Yersinia IgA & IgG Abs	21
Zinc	21
Zinc Protoporphyrins	21

TABLE A

DEPARTMENT OF THE ARMY
XXTH Combat Support Hospital
Laboratory Services
APO AE XXXXX-XXXX

Date:_____

SAMPLES SENT FOR TESTING

The following samples were sent to Landstuhl Regional Medical Center to be run for the tests indicated. Please send a copy of the result to the following address and e-mail. If you have any questions or concerns, please call or write to the address and e-mail below. The point of contact for this memorandum is Rank and Name, Laboratory Manager.

XXTH Combat Support Hospital
ATTN: _____ Laboratory Manager
Laboratory Services
APO, AE XXXXX-XXXX
DNVT: (XXX) XXX-XXXX
Email:

Packed by:_____

Verified by:_____

Requesting Physicians are listed below.

PATIENT NAME/RANK	SSN	SEX	DOB	UNIT/ BRANCH OF SERVICE	REQUESTING PHYSICIAN	PHYSICIAN EMAIL	DATE RESULTS REC.	TESTS REQUESTED

TABLE B

DEPARTMENT OF THE ARMY
XXTH Combat Support Hospital
Laboratory Services
APO AE XXXXX-XXXX

Date:_____

SAMPLES FOR REFERENCE LABORATORY TESTING

PATIENT NAME/RANK	SSN/ID	SEX	DOB	UNIT	BRANCH OF SERVICE	DATE COLL.	TIME COLL.	REQUESTING PHYSICIAN	PHYSICIAN EMAIL

TESTS REQUESTED:

Please send a copy of the results to the following address and e-mail. If you have any questions or concerns, please call or write to the address and e-mail below. The point of contact for this memorandum is Rank and Name, Laboratory OIC or NCOIC.

XXTH Combat Support Hospital
ATTN: Rank and Name, Laboratory OIC or NCOIC
Laboratory Services
APO, AE XXXXX-XXXX
DNVT: (XXX) XXX-XXXX
Email: first.last@us.army.mil

Central Requesting Physician is: Rank and Name, MD, SSN XXX-XX-XXXX

APPENDIX C

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